

**EVALUATION OF A TWO-PHASE PROGRAM USING
OPEN EDUCATIONAL RESOURCES AND TEXT MESSAGING TO
INCREASE THE RETENTION RATES OF
COMMUNITY COLLEGE STUDENTS**

by
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Abstract

Nationally, fewer than four out of ten community college students will complete a degree or certificate after six years (Bailey, Jaggars, & Jenkins, 2015). Retention and completion rates at Nashua Community College (NCC) in New Hampshire have been similarly low. Of 500 freshmen who enrolled at NCC in August 2014, 57.4% had failed to transfer to a four-year institution and/or earn an associate's degree after three years (Griswold, 2018). The purpose of this quasi-experimental mixed methods study was to evaluate a two-phase intervention designed to improve the long-term retention and completion rates of first-time freshmen enrolled in English composition (ENGL 101N) at NCC. The first phase of the intervention replaced the commercial textbook used in 18 sections of ENGL 101N with a no cost, open educational resources (OER) textbook. The theory of treatment hypothesized that lowering the cost of learning materials would encourage ENGL 101N students to earn more credits in the subsequent semester. Further, the adoption of the OER textbook would increase student engagement levels and contribute to improved academic outcomes including ENGL 101N grade, fall GPA, and fall to spring retention. The second phase of the intervention involved a text messaging campaign designed to inform ENGL 101N students about OER cost savings and the benefits of full-time enrollment. The theory of treatment hypothesized that improving communications between college personnel and students would clarify institutional expectations and lead to increased enrollment intensity during the subsequent semester. For community college administrators, faculty, and staff seeking evidence-based strategies to raise the retention and completion rates of their students, two promising findings emerged. First, analyses found no significant difference in the academic outcomes of English composition students who used a commercial textbook versus those who used a no-cost OER textbook. Second, the study did find evidence of a significant

association between the text messaging campaign and an increase in students' enrollment intensity during the spring semester.

Keywords: community college, retention, open educational resources, text-messaging

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Executive Summary

The purpose of this quasi-experimental mixed methods study was to evaluate a two-phase intervention designed to improve the long-term retention and completion rates of first-time freshmen enrolled in English composition (ENGL 101N) at Nashua Community College (NCC) in fall 2019. The first phase of the intervention replaced the commercial textbook used in 18 sections of ENGL 101N with a no cost, open educational resources (OER) textbook. OER are defined as

teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge. (Fischer, Hilton, Robinson, & Wiley, 2015, p. 160)

The theory of treatment hypothesized that lowering the cost of learning materials would encourage ENGL 101N students to use their cost savings to take more credits in the subsequent semester. Further, the adoption of the OER textbook would increase student engagement levels and contribute to improved academic outcomes including ENGL 101N grade, fall GPA, and fall to spring retention. The second phase of the intervention involved a text messaging campaign designed to inform ENGL 101N students about OER cost savings and the benefits of full-time enrollment. The theory of treatment hypothesized that improving communications between college personnel and students would clarify institutional expectations and lead to increased enrollment intensity during the subsequent semester.

To date, research to establish a positive association between OER adoption and the academic outcomes of college students has been inconclusive. As noted by Hilton (2016), a

comparison of nine different research studies revealed inconsistent findings and significant limitations. A more recent literature review showed a majority of studies found OER adoption had no significant influence on students' learning outcomes (Grimaldi, Mallick, Waters, & Baraniuk, 2019). On the other hand, the literature identified text messaging campaigns as a promising intervention to nudge students and influence their behavior (Bird, Castleman, Goodman, & Lamberton, 2017; Castleman & Page, 2014). The intent of this program evaluation was to add to this literature and provide practical insights for community college administrators, faculty, and staff considering OER adoption and/or text messaging campaigns as strategies to increase student retention rates.

Problem of Practice

If education is to serve as the great equalizer in American society (Tyack & Cuban, 1995), then community colleges play a vital role in this process by providing students with an accessible gateway to higher education (Bragg, 2001; Morest, 2013). This is especially true for populations that have been traditionally underrepresented at the college-level. These groups include those individuals less likely to attend college due to socio-economic status, age, race/ethnicity, secondary preparation, and/or parents' level of education (Clemens, 2016; Sutton, Muller, & Langenkamp, 2013; Wilson, 2014). Unfortunately, the problem of low retention and completion rates among community college students threatens to derail the plans of those who choose two-year colleges as their pathway to higher education. Nationally, fewer than four out of ten community college students will complete a degree or certificate after six years (Bailey, Jaggars, & Jenkins, 2015). Retention and completion rates at NCC have been similarly low. Of 500 freshmen who enrolled in August 2014, 57.4% had failed to transfer to a four-year institution and/or earn an associate's degree after three years (Griswold, 2018).

Factors Influencing the Retention of Community College Students

These retention and completion outcomes can be explained in part by a variety of barriers that increase the drop-out risk for community college students. These barriers include limited financial resources (Hicks, West, Amos, & Maheshwari, 2014; Hollifield-Hoyle & Hammons, 2015), lack of access to social capital (Clemens, 2016; Tovar, 2015), gaps in academic preparation (Ishitani, 2006; Wilson, 2014), and confusing bureaucratic processes (McKinney & Novak, 2013; Pellegrino & Hoggan, 2015). Studies suggest that a student's enrollment status (e.g., full-time versus part-time) is a key factor influencing retention rates (Crosta, 2014; Fike & Fike, 2008; Juskiewicz, 2017). To be more specific, full-time students appear to have higher rates of persistence, transfer and/or associate's degree completion than students who enroll on a part-time basis (Crosta, 2014; Fike & Fike, 2008; Juskiewicz, 2017). Because the factors contributing to this problem of practice are complex, ecological systems theory (Bronfenbrenner, 1979; Neal & Neal, 2013) provided a useful framework for organizing these factors from general to specific and exploring how they are interrelated. This literature review found that an examination of how interactions between the high school, family, and community college microsystems (Neal & Neal, 2013) influence students' enrollment decisions was a particularly relevant approach for identifying the most actionable factors associated with low retention rates at NCC.

Context and Needs Assessment

NCC is one of seven community colleges within the Community College System of New Hampshire. A comprehensive community college located in Nashua, New Hampshire, NCC offers 35 associate's degree and 22 certificate programs. Total enrollment in fall 2017 was 1,798 students. Demographics at NCC reflect limited racial/ethnic diversity. The majority of students,

74%, identify as White. Only 9% identify as Hispanic, 2% as Asian, and fewer than 2% as Black.¹ In terms of gender, 52% of the students are female and 48% are male. Although students range in age from 13 to 74 years, 70% of the student body is 25 years old or less (Nashua Community College, 2018). It is important to note that nearly 70% of NCC students attend college on a part-time basis (National Center for Education Statistics, 2018).

In spring 2018, I conducted a sequential explanatory mixed methods study (Buck, Cook, Quigley, Eastwood, & Lucas, 2009; Creswell, 2013) to establish the extent to which the same factors described in the literature affect student enrollment patterns at NCC. I began my analysis using institutional data to evaluate the relationship between enrollment patterns and academic outcomes of NCC students who first enrolled in the fall of 2014. Next, I evaluated Community College Survey of Student Engagement (CCSSE) results from spring 2017 to determine if two of the factors identified in the literature—the quality of faculty/student interactions and the level of support for learners—are positively associated with the enrollment patterns of NCC students. Finally, I conducted a focus group consisting of three NCC students to explain the quantitative findings and to identify additional factors not noted in the literature review.

Four key findings emerged from the needs assessment study. First, it appears that increasing the number of credits students complete in the first year could potentially have a positive impact on graduation and transfer rates at NCC (Crosta, 2014; Fike & Fike, 2008; Juskiewicz, 2017). Second, financial concerns appear to be a powerful factor influencing the enrollment decisions of NCC students (Hicks et al., 2014; Hollifield-Hoyle & Hammons, 2015). Third, the quality of faculty-student interactions at NCC is an important component related to

¹ The race/ethnicity for the remaining percentage of NCC students was not reported/unknown.

student engagement and persistence (Mitchell & Hughes, 2014; Nakajima, Dembo, & Mossler, 2012). Fourth, NCC faculty and staff will need to improve communications and clarify expectations to ensure more students make the appropriate enrollment decisions to earn an associate's degree or successfully transfer to a four-year institution (Bailey et al., 2015; Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008).

Theoretical Framework and Intervention Literature Review

Bean and Metzner's (1985) model of nontraditional student attrition provided a valuable theoretical lens for reviewing the literature and identifying the most feasible intervention for addressing the problem of low retention rates at NCC. Nontraditional college students typically display one or more of the following characteristics—they are over the age of 24, reside off campus, and attend classes on a part-time basis (Bean & Metzner, 1985). As a result, this model is more appropriate for the community college context than other theoretical frameworks such as Tinto (1975) designed for a more traditional four-year college or university setting. In Bean and Metzner's model of nontraditional student attrition, the influence of social integration variables (Tinto, 1975) on retention is minimized. Instead, a student's defining characteristics such as enrollment status, environmental variables such as family finances, and psychological outcomes such as student satisfaction play a much greater retention role for nontraditional students than they do for students attending four-year colleges and universities (Bean & Metzner, 1985).

A review of the intervention literature indicated that a two-step intervention involving OER and a text messaging campaign has the greatest potential to positively influence student enrollment patterns at NCC. Aligned with Bean and Metzner's model of nontraditional student attrition, this intervention simultaneously provided support to address the rising cost of college attendance (Hicks et al., 2014; Hollifield-Hoyle & Hammons, 2015; McKinney & Burrridge,

2015); introduced strategies to increase student engagement (Clemens, 2016; Mitchell & Hughes, 2014; Nakajima et al., 2012; Tovar, 2015); and communicated clear expectations about enrollment intensity and continuity to ensure more students earn an associate's degree or successfully transfer to a four-year institution (Bailey et al., 2015; Kuh et al., 2008).

Intervention and Research Methods

The intervention took place between August and December 2019 and it targeted 211 first-time freshmen enrolled in English composition (ENGL 101N) at NCC. All student participants were at least 18 years of age, first-time freshmen, and matriculated into an NCC program. The first phase of the intervention replaced the commercial textbook used in 18 sections of ENGL 101N with a no cost, open educational resources (OER) textbook. The second phase of the intervention involved a text messaging campaign to align with the start of the spring registration drive in early November 2019. The goal of the campaign was to remind ENGL 101N students about the cost savings associated with using a free textbook and to prompt them to register for additional credits during the spring semester.

The purpose of this program evaluation was to evaluate the extent to which the intervention may be associated with the academic success outcomes and subsequent enrollment status of first-year students enrolled at NCC in fall 2019.

The following research questions guided this study.

Process Evaluation Questions

RQ1. To what extent did ENGL 101N instructors implement the project as planned?

RQ2. To what extent were online OER learning materials accessible to students as planned?

RQ3. To what extent did ENGL 101N students use OER learning materials on a regular basis?

RQ3A. How was the course format (e.g., length of term; online/hybrid, face to face) associated with variation in students' usage of OER learning materials?

RQ3B. How was instructor experience associated with variation in students' usage of OER learning materials? For the purpose of this study, instructor experience is defined as the level of each instructor's familiarity with the no cost textbook (i.e., OER developer or OER adopter).

RQ4. To what extent was the text messaging campaign delivered as planned?

Outcome Evaluation Questions

RQ5. To what extent was the intervention associated with improved academic success and subsequent enrollment status of students enrolled in ENGL 101N at NCC in fall 2019, compared to outcomes for students in the same course in fall 2018?

RQ5A. How was variation in section format (e.g., length of term; online/hybrid, face to face) associated with variations in the academic success and spring enrollment status of ENGL 101N students in fall 2019?

RQ5B. How was variation in instructor experience associated with variations in the academic success and subsequent enrollment status of ENGL 101N students in fall 2019?

RQ6. To what extent does faculty and student focus group data reporting on the use of OER learning materials help explain the outcomes of a treatment program designed to increase the retention rates of first year students at NCC?

Research Design

The research design included both an evaluation of the intervention's process as well as an evaluation of the intervention's outcomes. The process evaluation examined the extent to which the program performed as intended while the outcome evaluation measured how well the program met established outcomes (Rossi, Lipsey, & Freeman, 2004). Both types of evaluation are an essential part of research design because they strengthen the researcher's ability to make valid inferences about program outcomes in non-experimental studies (Shadish, Cook, & Campbell, 2002).

Process evaluation. This study focused on three specific criteria for evaluating program performance: project implementation (Stufflebeam, 2003; Zhang et al., 2011); fidelity of implementation—dose (Dusenbury, Brannigan, Falco, & Hansen, 2003); and barriers (Baranowski & Stables, 2000). The study relied upon a variety of data collection tools including reports from the college's learning management system (Canvas), course syllabi, student surveys, a text messaging report, and focus group interviews with ENGL 101N students and faculty to analyze each process evaluation indicator.

Outcome evaluation. Aligned with a pragmatic research paradigm (Mertens, 2018), I selected a mixed methods quasi-experimental design for my outcome evaluation. This method embeds the collection, analysis, and synthesis of quantitative and qualitative data into a quasi-experimental quantitative design (Creswell & Plano-Clark, 2018). The study utilized student information system data to compare the academic outcomes (i.e., average grade in ENGL 101N, GPA at end of the fall semester, fall to spring retention rate, and the mean number of credits attempted in the spring semester) of students enrolled in ENGL 101N in fall 2019 (treatment group) with the outcomes of students enrolled in the same course in fall 2018 (control group). In

addition, I collected student and faculty focus group data to help explain quantitative results and strengthen the validity of my findings (Mertens, 2018).

Data Analysis

In keeping with the quasi-experimental mixed methods design, I incorporated both quantitative and qualitative strands in the data analysis plan. I analyzed quantitative data using descriptive and inferential statistical tests. Descriptive statistics, such as the calculation of frequencies, percentages, and means, provided me with information about the specific characteristics of my dataset. Inferential statistical tests, including independent sample t-tests, ANOVA, and regression analyses, allowed me to evaluate the associations between variables and make possible generalizations about my findings for a larger population (Lochmiller & Lester, 2017). In terms of qualitative analysis, I employed both a deductive and inductive coding process to evaluate student and faculty focus group data (Miles, Huberman, & Saldaña, 2014).

Findings

For community college administrators, faculty, and staff seeking evidence-based strategies to raise the retention and completion rates of their students, two promising findings emerged from this study. First, analyses found no significant difference in the academic outcomes of English composition students who used a commercial textbook versus those who used a no-cost OER textbook. This result is noteworthy because the cost of attendance is a serious barrier to persistence for many community college students (Hicks et al., 2014; Hollifield-Hoyle & Hammons, 2015; McKinney & Burrige, 2015). Although further research will be necessary, it follows that lowering the cost of attendance by expanding OER adoption beyond one course could have a positive influence on students' enrollment status and long-term outcomes including transfer and degree completion.

Second, the study did find evidence of a significant association between the text messaging campaign and an increase in students' enrollment intensity during the spring semester. As already noted, enrollment status is a defining variable linked to nontraditional student attrition (Bean & Metzner, 1985). Because nontraditional students typically attend college on a part-time basis, they are less likely to graduate as compared to students who attend on a full-time basis (Crosta, 2014; Fike & Fike, 2008; Juskiewicz, 2017; Klempin, 2014). This lack of enrollment intensity can be further compounded by a lack of information. Because two-year colleges typically serve a higher proportion of first-generation students than four-year institutions (Morest, 2013), community college students are more likely to have questions about the requirements to transfer or graduate on time. As evidenced by this study, community college administrators, faculty, and staff should not underestimate the importance of clearly communicating institutional expectations to students (Kuh et al., 2008). Text messaging campaigns to prompt students to maintain their enrollment continuity while increasing their enrollment intensity, particularly during the first year, could be one low-cost strategy for raising the transfer and degree completion rates of community college students.

Contents

Abstract	ii
Dissertation Approval Form	iv
Acknowledgements	v
Executive Summary	vii
List of Tables	xxv
List of Figures	xxviii
Chapter 1 The Community College as a Gateway to Higher Education	1
Historical Background	1
The Economic Necessity of Higher Education	1
Rising Tuition Costs Threaten Accessibility	2
An Increasingly Diverse Student Population	3
The Construct of Academic Success	4
Troubling Trends in Transfer and Degree Completion Rates	4
Problem of Practice	5
Theoretical Framework	6
Macrosystem: Political and Economic Influences on Retention Rates	8
Public Policy Changes Limit Access and Funding for Higher Education	8
Pell Grant changes.	8
State funding policy.	9
Economic Forces Impact Community College Enrollment	9
Exosystem: A Complex Mission and Diverse Student Identities	10
Complex Mission Statements	10

Diverse Identities of Community College Students.....	11
Microsystems: High School, Family, Community College	12
High School Preparation	13
Predictors of college success.	13
Deficiencies in secondary-level preparation affect college readiness.	14
Family Influences.....	15
Student Within the Community College.....	17
Quality of faculty/student interactions.....	17
Access to advising.....	20
Mesosystemic Interactions.....	22
Chaotic Enrollment Patterns of Community College Students.....	23
Family/Community College Mesosystemic Interaction	24
Conclusions.....	25
Chapter 2 Needs Assessment.....	26
Purpose of the Study	27
Research Questions	27
Quantitative Questions.....	27
Qualitative Question	28
Methods.....	28
Research Design.....	28
Quantitative Data Collection and Analysis.....	28
Phase 1 sample.....	29
Phase 1 instrumentation.	29

Phase 1 data collection and analysis.	29
Phase 2 sample.	30
Phase 2 instrumentation.	31
Phase 2 data collection and analysis.	32
Qualitative Data Collection and Analysis.....	32
Sample.....	33
Instrumentation.	33
Data collection and analysis.....	33
Findings.....	35
Research Question 1	35
Research Question 2	37
Research Question 3	41
Research Question 4	44
Limitations of College Survey of Student Engagement Data.....	46
Research Question 5	47
Limitations of Qualitative Analysis	47
Discussion	47
Quantitative Results	48
Qualitative Results	50
Conclusions.....	52
Chapter 3 Intervention Literature Review	54
Identifying a Theoretical Framework	54
The Shortcoming of Tinto’s (1975) Retention Model	55

Bean and Metzner's (1985) Model of Nontraditional Undergraduate Student	
Attrition.....	57
Potential Interventions to Improve Retention and Completion Rates at Nashua	
Community College	58
Defining Variable: Enrollment Status.....	58
15 to Finish campaigns.	60
Summary of the enrollment status variable.	62
Environmental Variable: Finances.....	63
Text messaging campaigns.	65
Summary of finance variable.	66
Psychological Outcome: Satisfaction	67
Student-centered pedagogy.....	69
Summary of psychological outcome.....	70
Addressing Multiple Variables: Open Educational Resources	71
Dependent variable: enrollment status.....	71
Environmental variable: finances.	72
Psychological outcome: increased student satisfaction.	73
Proposed Intervention	73
Conclusions.....	76
Chapter 4 Intervention Procedure and Program Evaluation Methodology	77
Purpose of the Study	77
Process Evaluation Questions	78
Outcome Evaluation Questions.....	80

Research Design.....	80
Process Evaluation	81
Outcome Evaluation.....	82
Methods.....	83
Participants.....	83
ENGL 101N students.....	83
ENGL 101N faculty.....	86
Measures	89
Process evaluation indicators.....	89
Project implementation indicator.....	89
Dose indicator.	90
Barriers indicator.	90
Outcome evaluation variables.....	90
Academic success—dependent variable.....	91
Enrollment intensity—dependent variable.	91
Moderating variables.	91
Procedure	92
Intervention.....	92
Prior to the start of the intervention.....	93
First 2 weeks of the fall semester.....	93
During the semester.	93
Data Collection	95
ENGL 101N course syllabi.....	95

Canvas reports.....	95
Student surveys.	96
Text messaging platform report.	98
Student information system data.....	98
Student and faculty focus groups.....	98
Data Analysis	99
Quantitative analysis.....	99
Project implementation (Research Questions 1 and 4).	101
Barriers (Research Question 2).....	101
Dose (Research Questions 3, 3A, and 3B).....	101
Academic success and enrollment status (Research Question 5).	102
Course format and instructor experience (Research Questions 5A and 5B).	103
Qualitative analysis (Research Question 6).	104
Summary Matrices	105
Chapter 5 Findings and Discussion.....	108
Process Evaluation Results	109
Research Question 1	110
Research Question 2	114
Research Question 3	118
Research Question 3A.....	122
Research Question 3B.....	123
Research Question 4	125
Outcome Evaluation Results.....	126

Comparison of Treatment and Control Groups	127
Research Question 5	128
Academic success.	128
Subsequent enrollment status.....	128
Research Question 5A.....	131
Research Question 5B.....	132
Research Question 6	135
Academic success outcomes.	135
Enrollment status.	136
Discussion	137
Process Evaluation	137
Project implementation.	137
Barriers.....	138
Dose.	139
Outcome Evaluation.....	140
Phase 1—open educational resources textbook adoption.	140
Phase 2—text messaging campaign.....	142
Limitations	144
Implications for Practice and Future Research	145
Conclusions.....	148
References	150
Appendix A Observation Notes	165
Appendix B Community College Survey of Student Engagement Sample Items.....	168

Appendix C Student Focus Group Interview Schedule for Needs Assessment Study	169
Appendix D Logic Model Depicting an Intervention to Address the Problem of Low Retention Rates at Nashua Community College.....	171
Appendix E Copy of Open Educational Resources Textbook Page From the College’s Learning Management System (Canvas).....	173
Appendix F Focus Group Interview Schedule for Students	174
Appendix G Focus Group Interview Schedule for Faculty	176
Appendix H Sample Informed Consent Form for Program Evaluation	177
Appendix I Survey Administered to ENGL 101N Students at Start of Fall 2019 Semester	183
Appendix J Survey Administered to ENGL 101N Students at End of Fall 2019 Semester	189
Biographical Statement.....	198

List of Tables

Table 1. Measuring and Operationalizing Constructs	30
Table 2. Operationalizing and Measuring the Construct of Student Engagement.....	31
Table 3. Academic Outcomes Based on Enrollment Status in First Semester	36
Table 4. Cross Tabulation of College Readiness and Enrollment Status	37
Table 5. Cross Tabulation of Age and Enrollment Status	38
Table 6. Cross Tabulation of Race/Ethnicity and Enrollment Status	38
Table 7. Cross Tabulation of Socioeconomic Status and Enrollment Status.....	39
Table 8. Cross Tabulation of Gender and Enrollment Status	39
Table 9. Frequency of Faculty–Student Interaction Based on Student Enrollment Status.....	43
Table 10. Two-Tailed Test for Equality of Means for Faculty–Student Interaction	43
Table 11. Level of Support for Learners Based on Student Enrollment Status.....	45
Table 12. Two-Tailed Test for Equality of Means for Support of Learners.....	45
Table 13. Factors Influencing the Enrollment Decisions of Nashua Community College Students.....	48
Table 14. English Composition Sections Offered at Nashua Community College in Fall 2019.....	85
Table 15. Comparison of Fall 2018 (Control) and Fall 2019 (Treatment) Cohorts of English Composition Students at Nashua Community College	87
Table 16. Process Evaluation Plan: Data Collection and Analysis Matrix.....	106
Table 17. Outcome Evaluation Plan: Data Collection and Data Analysis Matrix.....	107
Table 18. Implementation of Open Educational Resources (OER) Textbook Intervention in ENGL 101N Sections in Fall 2019.....	111

Table 19. Barriers to ENGL 101N Students Accessing Online Learning Materials in Fall 2019 at Nashua Community College	116
Table 20. Open Educational Resources Textbook Usage in ENGL 101N Sections in Fall 2019.....	119
Table 21. Textbook Page Views Across Sections	120
Table 22. ENGL 101N Students’ Usage of Open Educational Resources Textbook by Course Format—Length of Term	124
Table 23. Two-Tailed Test for Equality of Means for Textbook Page Views per Student—Length of Term	124
Table 24. ENGL 101N Students’ Usage of Open Educational Resources Textbook by Course Format—Face-to-Face Versus Online/Hybrid	124
Table 25. Two-Tailed Test for Equality of Means for Textbook Page Views per Student—Face-to-Face Versus Online/Hybrid.....	124
Table 26. ENGL 101N Students’ Usage of Open Educational Resources (OER) Textbook by Instructor Experience	125
Table 27. Two-Tailed Test for Equality of Means for Textbook Page Views per Student—Instructor Experience.....	125
Table 28. Analysis of Variance for Baseline Equivalencies of Treatment (Fall 2019) and Control (Fall 2018) Groups.....	129
Table 29. Estimate of Intervention Effects on ENGL 101N Students’ Grades, Fall to Spring Retention, and Fall Grade Point Average.....	130
Table 30. Two-Tailed Tests for Equality of Means by Course Format—Length of Term.....	131

Table 31. Two-Tailed Tests for Equality of Means by Course Format—Face-to-Face	
Versus Online/Hybrid	132
Table 32. Two-Tailed Tests for Equality of Means by Instructor Experience	133

List of Figures

Figure 1. Networked ecological systems theory model showing the problem of low retention rates among community college students.	7
Figure 2. Concept map depicting the problem of practice of low retention rates among community college students.....	23
Figure 3. Causal diagram outlining a theory of treatment for the problem of low retention rates at Nashua Community College.....	79
Figure 4. Diagram of a mixed methods quasi-experimental study to evaluate the process and outcomes of an intervention to address the problem of low retention rates among community college students.....	84
Figure 5. Notice of research study and link to beginning of the semester student survey posted in all sections of ENGL 101N in August 2019.....	94
Figure 6. Texting campaign with companion email targeting ENGL 101N students in November 2019.....	94
Figure 7. Sample new analytics Canvas report downloaded from a fall 2019 ENGL 101N course section.....	97
Figure 8. Evaluation timeline for a two-phase intervention to address the problem of low retention and completion rates of students at Nashua Community College.	100
Figure 9. Chart illustrating the percentage of ENGL 101N students who accessed the OER textbook during the fall 2019 semester by course section.	120
Figure 10. Histogram illustrating the variance in ENGL 101N students’ open educational resources textbook usage by course section.....	121

Figure 11. Text messaging platform report showing the delivery rate of a text messaging campaign targeting Nashua Community College students enrolled in ENGL101N in fall 2019.....	127
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Figure A1. Nashua Community College cafeteria at 9:52 a.m. on Tuesday, January 30, 2018.....	167
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Chapter 1

The Community College as a Gateway to Higher Education

If education is to serve as the great equalizer in American society (Tyack & Cuban, 1995), then community colleges play a vital role in this process by providing students with an accessible gateway to higher education (Morest, 2013). Community colleges have evolved over the past century to serve an increasingly diverse student population. However, the goal of successfully equipping students for careers and/or further postsecondary education is threatened by several recent trends. Framing the community college historically provides greater understanding of those recent trends and their implications for current students. The remainder of this chapter explores the underlying factors associated with low retention rates among community college students.

Historical Background

The nation's first community college, termed a junior college, was established in 1901 in Joliet, Illinois (Jurgens, 2010; Morest, 2013). Early junior colleges served a transfer function by preparing liberal arts students to transition successfully to a four-year college or university. Beginning with the Great Depression and continuing into the post-World War II era, the focus of community colleges shifted to job training. In 1947, the Truman Commission proposed the integration of these two separate functions into one comprehensive community college model (Jurgens, 2010). Issues of equity and the desire to increase access to higher education further motivated the Truman Commission (Bailey et al., 2015).

The Economic Necessity of Higher Education

With the coming of age of the Baby Boomers starting in the 1960s, enrollment in America's community colleges skyrocketed (Jurgens, 2010). Between 1970 and 2010, fall

enrollments increased from 2.2 million to 7.2 million students (Bailey et al., 2015). Further, 46% of undergraduates had enrolled in one of the nation's 1,000 community colleges by the early 2000s (Jurgens, 2010). Business and industry's demand for a more skilled workforce drove much of this growth.

As economic development and technical innovation necessitated post-secondary education, "college was no longer an opportunity that should be open only to the ambitious"—it "was an economic necessity" (Bailey et al., 2015, p. 6). A 2010 projection by the Georgetown University's Center on Education and the Workforce predicted that 63% of the nation's jobs would require post-secondary education by 2018. Further, there are clear economic benefits linked to community college attendance. On average, males with an associate's degree earn 13% more than those with a high school diploma. The gains are even greater for females with an associate's degree who earn 22% more than high school graduates (Belfield & Bailey, 2011). For those community college students who transfer to a four-year institution and go on to earn a bachelor's degree, wage gains are even more substantial. Studies show these students earn 23% to 43% more than those with only a high school diploma (Belfield & Bailey, 2011). There are also psychological and social benefits afforded to those individuals who earn a college degree (Sutton et al., 2013). Perhaps this is because higher earnings lead to improvements in health and overall well-being (Belfield & Bailey, 2011).

Rising Tuition Costs Threaten Accessibility

At the same time that economic necessity was driving the demand for increased access to higher education, rising tuition costs threatened to make a college degree unaffordable for many American families (Bailey et al., 2015). One study that examined enrollment, tuition levels, and grant amounts to community college students between 2000–2001 and 2005–2006 uncovered

some troubling trends (Kennamer, Katsinas, Hardy, & Roessler, 2009). The researchers selected this timeframe because there was a significant enrollment increase during this period coupled with a financial recession in 2003 that limited state funding to higher education. Although the study found that all types of direct student aid (federal, state, and institutional) increased, this aid was not enough to match rising tuition levels. As a result, more students were forced to take out student loans (Kennamer et al., 2009). In 2005-2006, for example, New Hampshire students had to borrow \$1,768 more to cover tuition costs than they did five years earlier (Kennamer et al., 2009.) Further, Kennamer et al. (2009) noted that community college students were paying more and getting less. This is because the addition of 2.3 million students between 2000 and 2006 strained the resources available for support services such as advising. This finding is significant since other studies have established a positive association between the quality of student-advisor interactions and student persistence in community college (Smith & Allen, 2014; Tovar, 2015).

An Increasingly Diverse Student Population

By the turn of the 21st century, community colleges were termed “the most important segment of America’s higher education system” (Bragg, 2001, p. 111) as students sought a pathway to a more affordable college degree. This trend has been especially true for those populations traditionally underserved by higher education (Bragg, 2001; Topper & Powers, 2013). Here traditionally underrepresented populations refer to those groups less likely to attend college as measured by race/ethnicity, socio-economic status, age, secondary preparation, and/or parents’ level of education (Wilson, 2014). The community college student demographic has become increasingly diverse in recent decades. Nationally, 15% of students enrolled in community colleges are Black. Further, 35% of all Black college students attend a two-year institution (Morest, 2013, p. 321). The number of Latino/a students using community college as

gateway to higher education has also been steadily increasing (Morest, 2013). Today, over 50% of Latino/a students enroll in community college after graduating from high school (Tovar, 2015).

The Construct of Academic Success

Discussion of the historical trends that shape the experiences of today's community college students illuminates the origins of the construct of academic success that will guide this study. From the time and original purpose of the first junior college (Jurgens, 2010; Morest, 2013), one clear measure of academic success has been transfer to a four-year college or university. A review of the literature indicates that transfer is a measure widely cited in multiple studies (Calcagno, Bailey, Jenkins, Kienzl, & Leinbach, 2008; Crisp & Delgado, 2014; Dowd & Melguizo, 2008; Eagan & Jaeger, 2009; McKinney & Hagedorn, 2017; Wang, 2009; Wilson, 2014). The workforce development function of the community college mission (Jurgens, 2010) links directly to the second measure of academic success—degree completion. Again, this is a metric widely cited in the literature (Boswell & Passmore, 2013; Calcagno et al., 2008; Crosta, 2014; Hicks et al., 2014; Ishitani, 2006).

Troubling Trends in Transfer and Degree Completion Rates

A view of the community college through a historical lens reveals some troubling trends when it comes to transfer and degree completion. In terms of transfer, community colleges fall short when it comes to closing the achievement gap in American higher education first identified by the Truman Commission in 1947. Dowd and Melguizo (2008) compared the enrollment and bachelor's degree completion rates among community college transfer students in the 1980s and the 1990s. In spite of public policies established to facilitate the transfer process (e.g., articulation agreements and curricular alignments), students from the lowest socioeconomic

quintiles were still "severely underrepresented among the transfer cohorts in both decades" (Dowd & Melguizo, 2008, p. 380). Also, fewer than 25% of Latino students successfully transfer to a four-year institution even though 80% of these students enter community college with transfer as a goal (Tovar, 2015).

Today, associate's degree completion rates continue to be much too low. Fewer than 20% of community college students will earn a degree after three years (Bailey et al., 2015). For some groups, the numbers are even lower. Black males, for example, have the lowest graduation rates among all groups of community college students. Only 16% of Black males earned a degree after three years (Wood, Newman, & Harris, 2015). Overall, fewer than four out of ten community college students in the United States will complete a degree or certificate after six years (Bailey et al., 2015). These statistics are explained in part by chaotic enrollment patterns (Crosta, 2014) that extend the time to degree completion and increase the dropout risk for community college students (Fike & Fike, 2008).

Problem of Practice

Nashua Community College (NCC) in New Hampshire has experienced similar enrollment and retention trends as those observed at the national level. NCC is a comprehensive community college located in a small city that borders the state of Massachusetts. In support of its mission to provide "quality, academically rigorous, higher-education programs focused on the diverse needs of students and the community" (Nashua Community College, 2020, p. 1), NCC offers 35 associate degree and 22 certificate programs. One of seven community colleges within the Community College System of New Hampshire, NCC had an enrollment of 1,798 students in fall 2017 (Nashua Community College, 2018).

Although NCC's enrollment increased significantly beginning in the early 2000s, retention rates remained low. For example, enrollment in the liberal arts program increased by 270% between 2003 and 2016; however, the program's retention rate from fall 2014 to fall 2015 was 37.4% (Frankland, 2016). In terms of academic success outcomes, graduation and transfer rates at NCC are also low. Of 500 first-time freshman who enrolled in the fall of 2014, 57.4% had failed to transfer to a four-year institution and/or earn an associate's degree after three years (Griswold, 2018).

Theoretical Framework

Ecological Systems Theory (EST; Bronfenbrenner, 1979) provides a useful framework to structure a review of the literature exploring the factors contributing to low retention rates among community college students. It provides a deeper understanding of the contributing factors by highlighting how “interdependent and multilevel” systems (Neal & Neal, 2013, p. 723) affect academic outcomes. In other words, EST makes it possible to go beyond those factors that are directly associated with the individual student (e.g., family, teachers, advisors, peers) and consider the influence of systemic factors (e.g., labor market trends, tuition costs, college debt levels) to gain a holistic view of low retention rates among community college students. When investigating those ecological systems closest to the student, however, it becomes more relevant to use a *networked* perspective (Neal & Neal, 2013) rather than a *nested* approach (Bronfenbrenner, 1979). The networked EST model views the ecological environment as a set of overlapping systems—“each directly or indirectly connected to the others by the direct and indirect social interactions of their participants” (Neal & Neal, 2013, p. 727). In this model, the exosystem, microsystem, and “mesosystemic interactions” (Neal & Neal, 2013, p. 728) are conceptualized as interconnected social networks that shape the student's experience. Further, a

networked approach will make it easier to identify those factors that are the most actionable since it focuses on social interactions closest to the student (see Figure 1). In the following sections, I explore the factors influencing low retention rates within each of these networked systems.

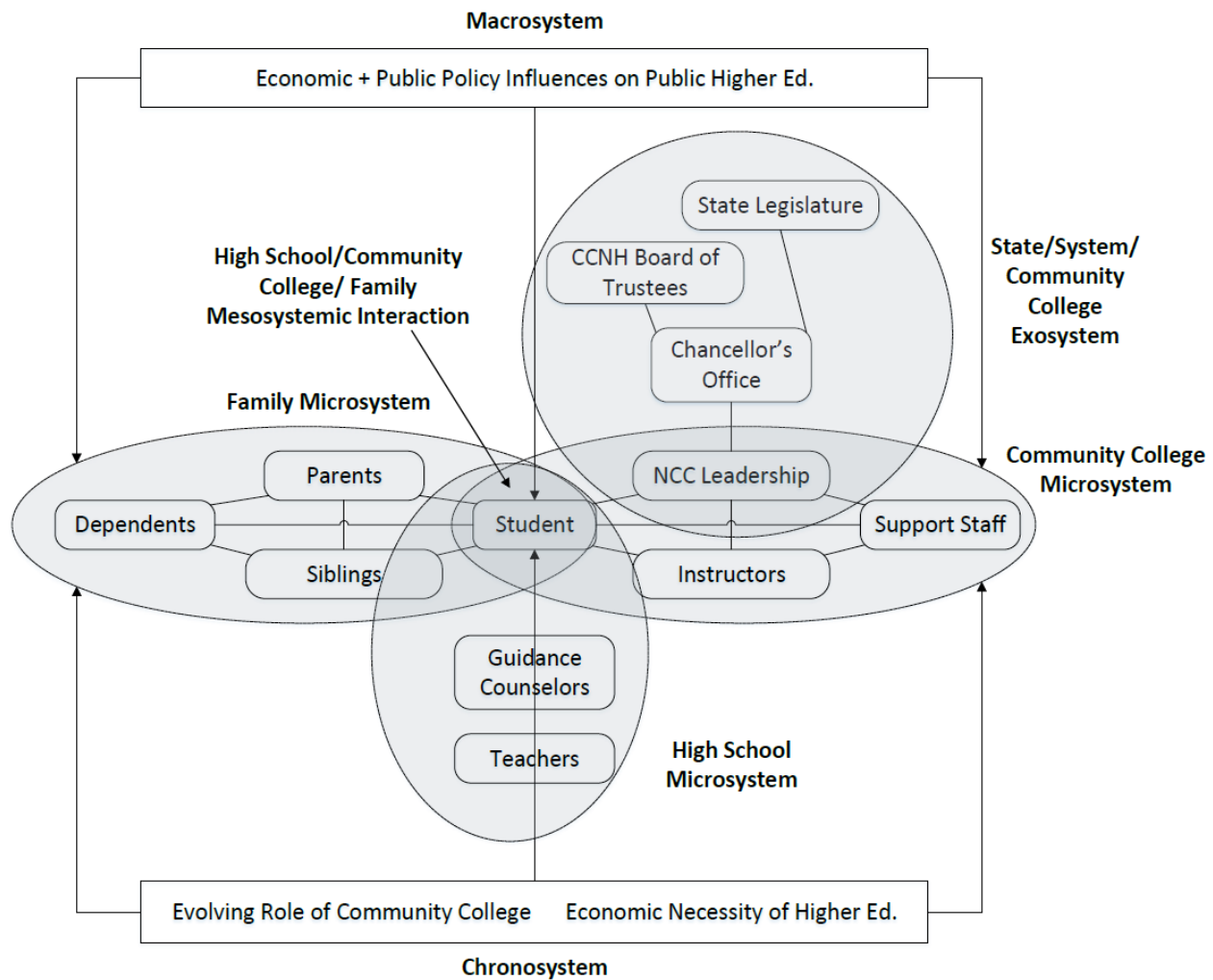


Figure 1. Networked ecological systems theory model showing the problem of low retention rates among community college students. Adapted from “Nested or Networked? Future Directions for Ecological Systems Theory,” by J. Neal and Z. Neal, 2013, *Social Development*, 22, p. 730. Copyright 2013 by John Wiley and Sons. Adapted with permission.

Macrosystem: Political and Economic Influences on Retention Rates

The macrosystem (Bronfenbrenner, 1979; Neal & Neal, 2013) considers the student experience from a systemic point of view. In terms of this problem of practice, the macrosystem exposes broad political and economic factors that affect social interactions and influence community college retention rates. It is essential to understand these factors to have a complete understanding of the problem; however, they tend to be less actionable due to their extensive scope.

Public Policy Changes Limit Access and Funding for Higher Education

Pell Grant changes. More students are becoming dependent on financial aid due to rising tuition costs (Hicks et al., 2014). Between 2006-07 and 2010-2011, the percentage of first-time, full-time students receiving financial aid at two-year institutions increased from 67% to 77% (Hicks et al., 2014). Pell grants provided by the federal government are a particularly important source of financial aid for low-income students (Hollifield-Hoyle & Hammons, 2015). However, recent policy changes limit access to this source of funding. In 2011, the Federal government enacted changes that reduced the length of Pell Grant eligibility from 18 to 12 semesters. A study conducted to project the impact of this policy change found that Pell Grant eligibility changes will have a “significant impact” (Hicks et al., 2014, p. 152) on enrollment, revenue, and graduation rates at Virginia’s rural community colleges. More specifically, the researchers predicted that enrollment levels could decline by 7% and graduation rates could decline by as much as 13% as a result of Pell Grant changes. Although focused on rural Virginia, this study has important implications for this problem of practice. Since community colleges serve a disproportionately high number of low-income students who rely upon Pell Grants for support (Hollifield-Hoyle & Hammons, 2015), any changes that impact Pell Grant eligibility

could significantly increase attrition rates among community college students nation-wide. Further, a decrease in college revenue could strain resources and lead to reductions in essential student support services such as advising (Smith & Allen, 2014).

State funding policy. As public institutions, community colleges are dependent on state funding as a critical source of revenue. Starting in 2014-15, 32 states have adopted performance-based funding (PFB) plans could threaten access to higher education for some traditionally underserved populations (McKinney & Hagedorn, 2017). Based on a Texas model, states with PFB plans allocate funds to each community college district based on the number of student success points earned. Success points are awarded based on incremental achievements such as completing developmental courses, earning 15 credits, and transferring to a four-year institution. A study by McKinney and Hagedorn (2017) uncovered some troubling trends as a result of this policy change. Analysis found that African American students, older students, those who attend college part-time, and those in need of extensive remediation earned the least amount of funding for the community college district. The researchers posit that Texas' PFB model may prompt college administrators to exclude those students who are less likely to secure state funding.

Economic Forces Impact Community College Enrollment

In addition to public policy issues, economic factors are closely tied to this problem of practice. For every one percent increase in the unemployment rate, community college enrollment demand increased between 1.1 and 3.3% (Hillman & Orians, 2013). This finding was based on a longitudinal study of national enrollment trends conducted between 1990 and 2009. Hillman and Orians (2013) concluded that full-time student enrollment numbers were more sensitive to unemployment rates than those of part-time students. Further, the study confirmed the idea that community college enrollment is counter-cyclical and more sensitive to changes in

the labor market than other sectors of higher education (Hillman & Orians, 2013). These findings appear to explain why enrollment in the liberal arts program at Nashua Community College (NCC) skyrocketed by 270% during the Great Recession. Currently, New Hampshire has one of the lowest unemployment rates in the country (Gittell, 2016). As a result, it is likely that lower retention rates observed at NCC (Frankland, 2016) can be tied to the healthy state of the New Hampshire economy.

Exosystem: A Complex Mission and Diverse Student Identities

For the purpose of this problem of practice, the exosystem considers how social interactions at the institutional level indirectly impact the student experience. More specifically, complex mission statements are confusing for stakeholders (Lake & Mrozinski, 2011). A diverse student body that presents many challenges in terms of college-readiness (Morest, 2013) further complicates this situation. It follows that an unclear mission, coupled with the need to serve a diverse student body, could create an educational environment that discourages student persistence. Although not as broad in scope as macrosystem, factors at the exosystem level tend to be less actionable since they are not directly connected to the student.

Complex Mission Statements

In a 2013 article, Morest used the term “multipurpose college” (p. 320) to describe the many functions performed by today’s comprehensive community colleges: “Community college missions include long and short-term occupational education leading to degrees and certificates, liberal arts education leading to degrees and transfer, non-credit education aimed at skills development or self-improvement” (p. 320). Other authors have similarly defined the multi-faceted mission of the modern community college (Bailey et al., 2015; Bragg, 2001; Jurgens, 2010; Lake & Mrozinski, 2011). Although these individual goals are laudable, complex mission

statements can be problematic. One study interviewed community college administrators from nine institutions noted for the strength of their strategic planning (Lake & Mrozinski, 2011). Administrators identified seven common functions of the mission statement. The top three cited were goals clarification, marketing, and accreditation requirements. Unfortunately, the researchers noted these functions can often be in conflict with each other and this can lead to confusion among the college's stakeholders. With confusion over purpose, it is easy to understand how college operations become disconnected. This results in an environment where "students must rely mostly on themselves; professors and advisors generally work in isolation; and there is little coordination between instructors and student services personnel" (Bailey et al., 2015, p. 15).

Diverse Identities of Community College Students

The diverse identity of the student body further complicates the task of establishing clear mission statements that align department functions and focus on student outcomes. According to Morest (2013), "The 'non-traditional student' is the majority student at community colleges" (p. 321). This is because community colleges provide an accessible gateway to higher education that is low-cost and close to home (Morest, 2013). In terms of race and ethnicity, for example, 70% of Black males (Wood et al., 2015) and over 50% of Latinos/as (Tovar, 2015) enter higher education at the community college level. Recent trends suggest the percentage of Latino/a students attending community college will continue to increase (Morest, 2013). McKinney and Burrige (2015) explain this trend by showing that Hispanic students are more reluctant to take out educational loans as compared to their White and African American classmates. Although 16.6% of their study sample included Hispanic students, they found only 5.7% of first year college students who took out federal education loans were Hispanic (McKinney & Burrige,

2015). These findings are significant because “a U.S. financial system increasingly dominated by loans is diverting Hispanic students away from baccalaureate institutions” (McKinney & Burrige, 2015, p. 313). In terms of other demographic groups, community colleges tend to enroll more first-generation students than four-year institutions (Morest, 2013). Although first-generation can be defined in a variety of ways, it typically refers to the amount of post-secondary education a student’s parents have completed. Further, community colleges provide an access point to higher education for academically underprepared students (Morest, 2013) as well as the majority of low-income undergraduates (Bailey et al., 2015).

In describing the diverse identities of today’s community college students, one study is particularly noteworthy. Levin, Viggiano, Lopez Damion, Morales Vazquez, and Wolf (2017) criticized the one-dimensional descriptions of community college students (e.g., first generation, nontraditional, low-income, Latino/a, female, African American, remedial, etc.) common in the research literature. Instead, they posited that community college identity is in fact complex, dynamic, and distinct from the identity of four-year students. These findings are significant for two reasons. First, they concur with Martin, Galentino, and Townsend (2014) that theoretical frameworks such as Tinto’s (1975) model of student integration (originally designed four-year students) need to be adapted to fit the community college context. Second, the diverse nature of the community college population suggests there can be no one-size-fits all solutions when it comes to the problem of low retention.

Microsystems: High School, Family, Community College

The microsystem is a social network or setting that includes the student (Neal & Neal, 2013). In looking at the problem of low retention rates among community college students, social interactions within the high school, the family, and the community college are all

representative of the microsystem. Due to their direct proximity to the student, a close examination of these settings should begin to reveal those factors that are the most actionable.

High School Preparation

Predictors of college success. For those students typically served by community colleges, several factors expressed within the high school microsystem appear to be predictive of college success as measured by persistence, transfer, and degree completion. First is the academic rigor of the high school curriculum (Ishitani, 2006; Wang, 2009). One study that utilized data from the National Education Longitudinal Study of 1988 (NELS:88/2000) and the Postsecondary Education Transcript Study (PETS) went so far to suggest that demographic disadvantages such as low SES could be reversed with exposure to a rigorous high school curriculum (Wang, 2009). “High school academic attributes” are also “pivotal” for predicting which first-generation students will go on to earn a college degree (Ishitani, 2006, p. 881).

In addition to high school GPA and curricular rigor, a student’s self-efficacy and engagement in extracurricular activities are indicators of college success (Sciarra, Seirup, & Sposato, 2016). Other studies validate these findings. Vuong, Brown-Welty, and Tracz (2010) found that self-efficacy has an important influence on academic outcomes such as GPA as well as persistence rates among first-generation students who are college sophomores. Further, Wood et al. (2015) noted that math self-efficacy, defined as asking for help in math class, was “significantly predictive” (p. 3) of academic integration for Black male students who attended community college.

Given the importance of participation in extracurricular activities as a predictor of college success, low-income students may be at a disadvantage since this group tends to have higher mobility rates (Sutton et al., 2013). The researchers found that student who changed high schools

mid-year were less likely to attend college as compared to other groups. They explained this, in part, by extracurricular disruptions that prevented transfer students from accessing “valuable school-based relationships” and opportunities for “faculty-mentorship” (Sutton et al., 2013, p. 78). These findings are significant because they highlight student mobility as a factor contributing to this problem of practice. Gupton’s (2017) study of homeless community college students further supports this idea.

A third high school predictor of college success is access to career planning resources. Students with clearly established career goals are more likely to persist during the first year of college (Germeijs & Verschueren, 2007). A study by Martin et al. (2014) similarly found a positive association between a student’s ability to establish clear goals and college success. Since many community college students enroll before deciding on a major (Bailey et al., 2015), these findings suggest that early access to advising could improve retention rates.

Deficiencies in secondary-level preparation affect college readiness. Gaps in high school preparation appear to be a significant factor contributing to this problem of practice. Approximately, 60% of community college students enroll in developmental coursework because they lack college-level skills (Bailey et al., 2015; Crisp & Delgado, 2014). A 2014 study by Crisp and Delgado found that enrollment in a developmental math and/or English course significantly decreased the odds of successful transfer to a 4-year institution. It is surprising to note that Crisp and Delgado found there was no significant relationship between enrollment in developmental coursework and student persistence into the second year of college. These findings appear to contradict Bailey (2009), who found that less than half the students who began the developmental course sequence ever completed it. Further, fewer than 25% of developmental students complete a degree or certificate program after eight years (Bailey, 2009).

Morest (2013) provided an important counterpoint by suggesting that placement in developmental coursework may not always be due to a lack of academic preparation. Instead “weak social supports” and “problems with the validity of the placement testing process” could play a role (Morest, 2013, p. 323). In addition, bias could influence decisions about course placement. Matos (2015) detailed how the cultural deficit model has traditionally been used by educators to “place the blame for a lack of educational success on communities of color” (p. 437). These factors could partly explain why developmental students are more likely to be female, African American or Hispanic, first-generation, and/or older (Crisp & Delgado, 2014).

Family Influences

In terms of this problem of practice, the social interactions in the family microsystem are especially influential for first-generation, low-income, and adult learners. Community colleges tend to enroll a high percentage (between 43-48%) of first-generation college students (Morest, 2013). Unfortunately, first generation college students have higher attrition rates than other students and are less likely to graduate on time (Ishitani, 2006; Vuong et al., 2010). This is likely due to the fact that their parents lack the knowledge and experience to guide students through the often complex and confusing process of college admissions (Ishitani, 2006). For first generation Latino/a students, these effects are further amplified by cultural barriers (Clemens, 2016; Vuong et al., 2010). Studies also find that first-generation students tend to work more hours per week than their peers whose parents earned college degrees (Morest, 2013). Although a study by Boswell and Passmore (2013) found no relationship between the number of hours a student worked per week and academic success as measured by degree or coursework completion, other research contradicts these findings (Dundes & Marx, 2007).

Because community colleges offer an affordable pathway to higher education, they serve a higher percentage of low-income students as compared to four-year institutions (Hicks et al., 2014). Despite the importance of this demographic group, there is less empirical research focusing on the socioeconomic status of community college students. Hollifield-Hoyle and Hammons (2015) noted this gap in the literature. The purpose of their qualitative study was to examine the experiences of low-income community college students since few researchers have considered socioeconomic status as an aspect of diversity. Among their conclusions, they noted that “planning and decision making in higher education often failed to consider and meet the unique needs of low-income students” (Hollifield-Hoyle & Hammons, 2015, p. 57). Gupton’s (2017) study of homeless students validates this finding. Although there were an estimated 1.7 million homeless youth living in the U.S. in 2008, it is difficult for community colleges to support this population since no records are kept that indicate the number of homeless students on campus (Gupton, 2017).

Rising tuition costs are especially detrimental to low-income students. In their study, Hollifield-Hoyle and Hammons (2015) found that Pell Grants were insufficient to cover students’ educational costs. Financial worries were a constant source of stress (Hollifield-Hoyle & Hammons, 2015). As a result, more low-income students were using loans to pay their tuition bills (McKinney & Burrridge, 2015). Unfortunately, McKinney and Burrridge (2015) found there is a negative association between borrowing and persistence. The researchers concluded that “those who borrow federal student loans during their 1st year of enrollment have higher odds of eventually dropping out than non-borrowers” (McKinney & Burrridge, 2015, p. 314). Data analysis revealed that 34.2% of student borrowers had dropped out after three years with a median student debt of \$3,000. These students had higher unemployment rates and were four

times more likely to default on their loans (McKinney & Burrige, 2015). Building upon the findings of Kennamer et al. (2009), this study has important implications for this problem of practice. Since community colleges serve a disproportionate number of economically disadvantaged students (Hicks et al., 2014), it follows that incurring higher levels of student loan debt would be a powerful deterrent to retention.

For adult learners, family support networks are especially critical. A qualitative study of two female veterans highlighted the close association between family and student success (Pellegrino & Hoggan, 2015). For both students, their husbands supported their decision to return to school. Also, childcare was a “major factor influencing their schedules and long-term plans” (Pellegrino & Hoggan, 2015, p. 129). They called upon family and friends to provide childcare services. Without this essential support, it would have been impossible for these women to continue their education (Pellegrino & Hoggan, 2015). The researchers concluded that veterans, especially women, have "unique needs" (Pellegrino & Hoggan, 2015, p. 129). Beyond the importance of family supports, this finding adds another dimension to the factor of student diversity at the community college level (Levin et al., 2017).

Student Within the Community College

Quality of faculty/student interactions. Within the community college microsystem, the social interaction between students and faculty is an essential component of this problem of practice. Although there is an abundance of research comparing instructional strategies, modalities, and teaching effectiveness at two-year colleges, the literature agrees on one key fact—the quality of faculty/student interactions is directly associated with student success outcomes (Clemens, 2016; Mitchell & Hughes, 2014; Nakajima et al., 2012; Tovar, 2015). Unlike students at four-year institutions who have ample opportunity for social integration

outside the classroom (Tinto, 1975), most community college students live at home, work off-campus, attend part-time, and seldom participate in campus activities (Mitchell & Hughes, 2014). As a result, the classroom serves as the main point of contact for community college students (Mitchell & Hughes, 2014). Mitchell and Hughes (2014) showed that students with “higher student-instructor interactions are 1.11 times more likely to persist, and students who have increased instructor-student interactions are 1.22 times more likely to intend to persist” (p. 70). Further, student beliefs about faculty concern are closely associated with academic success outcomes. Mitchell and Hughes (2014) observed that students’ perceptions of their “instructors’ availability, concern, and interest has positive and significant effects on persistence” (p. 65). In fact, student perceptions may be just as influential as actual faculty/student interactions when it comes to retention. Nakajima et al. (2012) noted “that perceived interest by faculty—and not actual interaction—may be sufficient to influence students’ behavior” (p. 605).

Studies examining online learning environments and pedagogy further support the idea that quality faculty/student interactions are essential for student success. Online learning is becoming increasingly popular at the two-year level. In fact, almost half of today’s community college students have taken at least one online course (Jaggars, 2014). The growing diversity of the student population can partially explain this trend. For example, 80% of the student sample reported working and one-third mentioned balancing school and childcare responsibilities as reasons for taking an online course (Jaggars, 2014). Despite the convenience, community college students tend to perform worse in an online environment than in face-to-face classes (Jaggars, 2014). Jaggars (2014) suggests this is due to a lack of quality faculty/student interaction in online courses. For this reason, most community college students prefer to enroll in a mixture of online and face-to-face classes each semester (Jaggars, 2014). Further, a face-to-face modality is the

preference for courses that are important to the student's program or perceived as difficult. These findings reinforce the idea that the quality of faculty/student interactions are a positive influence on community college retention rates (Clemens, 2016; Mitchell & Hughes, 2014; Nakajima et al., 2012; Tovar, 2015).

Pedagogy is also an important consideration for this problem of practice (Bailey et al., 2015)—especially the extent to which teaching strategies promote student engagement (Kuh et al., 2008). One study compared knowledge gains in two biology classrooms (Lysne & Miller, 2017). One instructor used a traditional lecture-based approach and the other instructor incorporated more active learning strategies. Although this study found no differences in knowledge gains or knowledge retention between the control and treatment groups, students in the active learning classroom had lower attrition rates than those in the lecture-based classroom. This result seems to support the findings of other studies that recognize the importance of faculty-student interactions when it comes to student persistence (Mitchell & Hughes, 2014; Tovar, 2015). This study is noteworthy because it suggests the mode of instruction is less important than the quality of the faculty/student relationship.

An important controversy noted in the literature review revolved around the use of adjunct faculty and the implications for instructional quality. Community colleges are heavily reliant upon adjunct faculty (Bailey et al., 2015). Between 1975 and 1995, the number of adjunct faculty increased by 103% (Umbach, 2007). By 2003, over 66% of community college faculty are classified as part-timers (Eagan & Jaeger, 2009). Some studies suggest the dependence of community colleges on part-time faculty could be an important contributing factor to this problem of practice (Eagan & Jaeger, 2009; Umbach, 2007). In a 2009 study, Eagan and Jaeger examined transcripts, faculty employment data, other institutional information, and IPEDS data

to trace two cohorts of students in the Community College System of California over five years. Although the study did not establish a causal relationship, findings revealed “a significant and negative association” between students’ transfer likelihood and their exposure to part-time faculty instruction” (Eagan & Jaeger, 2009, p. 180). Likewise, a 2007 study by Umbach found that “part-time faculty are underperforming in their delivery of undergraduate instruction” (p. 110). For example, they spend less time interacting with students and they require slightly less effort from their students than their full-time colleagues (Umbach, 2007).

Schutz, Drake, Lessner, and Hughes (2015) provided an interesting counterpoint to these findings. They surveyed 1,559 community college faculty and asked them to identify the most important factor in determining a final grade. They found that adjunct-faculty selected “sympathy for student personal circumstances” while full-time faculty selected “teaching effectiveness” (Schutz et al., 2015, p. 188). These findings suggest that adjunct faculty spend more time getting to know their students since their focus is solely on teaching. Thus, adjunct faculty have an equal or greater ability to establish the type of quality faculty/student interactions shown to promote student persistence (Mitchell & Hughes, 2014; Tovar, 2015) as full-time faculty. In the end, it appears that an instructor’s ability to cultivate a positive faculty/student relationship is more relevant than an instructor’s employment status when it comes to student retention.

Access to advising. Although the classroom is the main point of contact for community college students (Mitchell & Hughes, 2014), other studies suggest that access to advising is another factor closely tied to academic integration and retention outcomes (Smith & Allen, 2014; Tovar, 2015). Smith and Allen (2014) found that students reported developing “knowledge and attitudes predictive of success” (p. 60) when they had more frequent interactions with academic

advisors. Results were similar for Latino/a community college students (Tovar, 2015). Tovar's (2015) survey of 397 Latino/a students revealed "a small but significant impact" (p. 62) of institutional agents and support programs on educational outcomes of Latino/a community college students as measured by GPA and intent to persist.

Since studies show that some populations typically served by community colleges are more likely to struggle with mental health issues (Hollifield-Hoyle & Hammons, 2015; McLeod, Uemura, & Rohrman, 2012; Pierceall & Keim, 2007), the need for adequate advising and other student support services is even more acute. For example, a study by McLeod et al. (2012) concluded that "disadvantaged social statuses are generally associated with high levels of distress and high rates of disorder" (p. 482). Further, homelessness and high mobility are closely associated with issues such as substance abuse, mental health, poverty, violence, and family disruptions (Gupton, 2017). These findings are in keeping with those of Hollifield-Hoyle and Hammons (2015), who reported the connection between the low socioeconomic status of community college students and heightened stress levels. Unfortunately, most community colleges are severely under-resourced when it comes to student support services (Kennamer et al., 2009). For some advisors, the caseload can be as high as 800 to 1,200 students (Bailey et al., 2015).

Although these findings suggest a simple intervention for this problem of practice would be to increase the number of advisors, a further review of the literature shows this may not be the case. In fact, studies show that many community college students who could benefit from support services like advising are reluctant to seek assistance (Bukoski & Hatch, 2016; Gupton, 2017). Although other studies have described the attrition rates of Black male students (e.g., Wood et al., 2015), Bukoski and Hatch (2016) used masculinity theory to explain why Black and

Latino male struggled in the transition from high school to community college. Results revealed they were reluctant to seek help because they feared it would make them appear vulnerable. Also, these students felt solely responsible for their academic success. Researchers concluded that community colleges are well-positioned to serve the unique needs of men of color; however, an effort must be made to reach out to this population (Bukoski & Hatch, 2016). Likewise, a study of homeless community college students found them reluctant to access student support services (Gupton, 2017).

Other research suggests that individual student characteristics have a greater impact on student success than institutional factors such as access to advising (Calcagno et al., 2008). In other words, well-prepared students will perform well regardless of the setting. “Students with many challenges, including personal and financial responsibilities, may have trouble even in strong colleges” (Calcagno et al., 2008, p. 644). Similarly, Martin et al. (2014) found that associate’s degree completion was heavily dependent on a student’s personal characteristics including: “a) clear goals; b) strong motivation; c) the ability to manage external demands; and d) self-empowerment” (p. 229). Given these findings, it may be more productive to focus on interventions in the classroom rather than on interventions associated with student support services.

Mesosystemic Interactions

In the end, an examination of the three microsystems reveals the factors associated with this problem of practice are complex and interrelated. Studies confirm there are multiple variables that contribute to low retention rates among community college students (Nakajima et al., 2012; Wang, 2009). As a result, it will be useful to focus on mesosystemic interactions to develop a more complete understanding of this problem and to begin to identify the most

actionable factors related to this problem of practice. Within a networked EST perspective, the mesosystemic interaction occurs when social networks of two or more microsystems overlap (Neal & Neal, 2013). When considering the academic outcomes of community college students, it appears the high school, family, and community college microsystems combine to play an especially important role in influencing the enrollment decisions of community college students (see Figure 2).

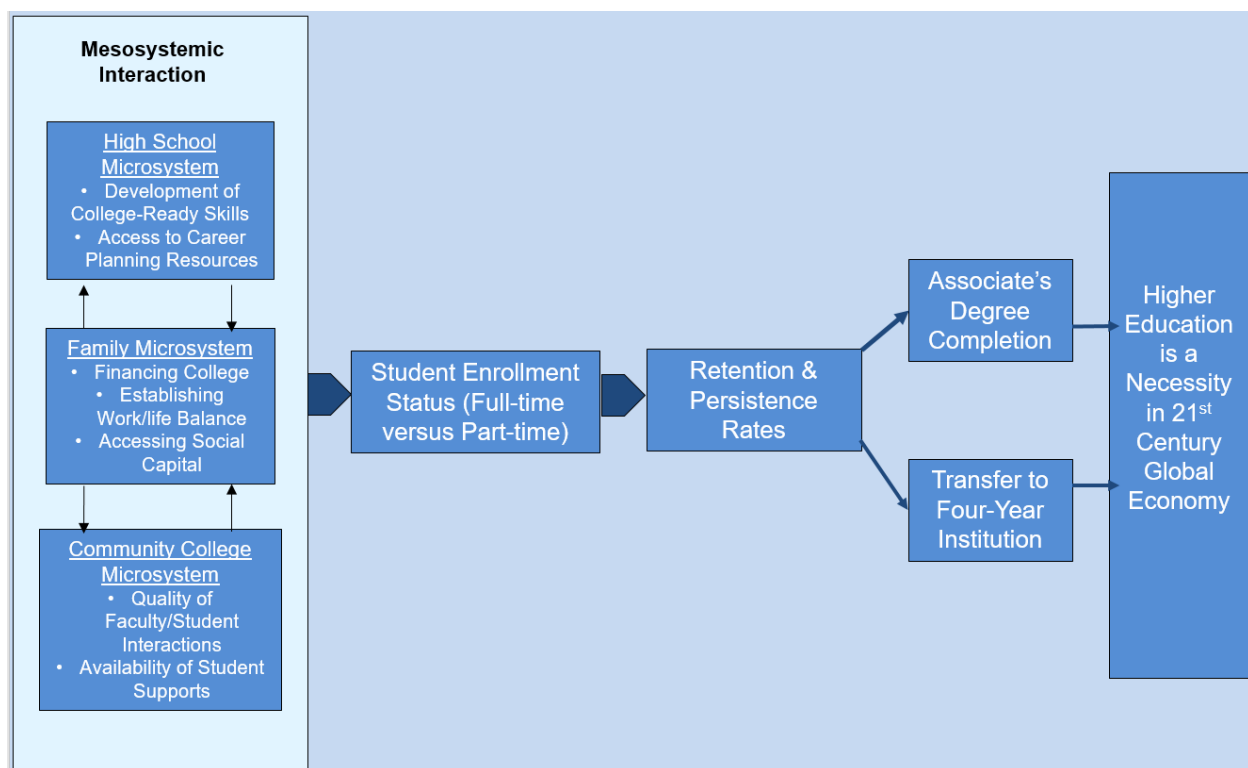


Figure 2. Concept map depicting the problem of practice of low retention rates among community college students. The microsystem is a social network or setting that includes the student (Bronfenbrenner, 1979). Within a networked ecological systems theory perspective, the mesosystemic interaction occurs when social networks of two or more microsystems overlap (Neal & Neal, 2013).

Chaotic Enrollment Patterns of Community College Students

Research suggests there is a close association between community college enrollment patterns and measures of academic success including degree completion and transfer (Crosta,

2014; Fike & Fike, 2008; Juszkievicz, 2017). Unlike their peers at four-year institutions, community college students are more likely to attend school on a part-time basis (Boswell & Passmore, 2013; Fike & Fike, 2008). Further, the enrollment patterns of these students tend to be very irregular. For example, only 1.2% of community college students attend class in a traditional pattern (e.g. fall-spring-fall-spring with full-time enrollment each semester; Crosta, 2014). Research indicates that a student's enrollment status is associated with persistence, with students enrolled full-time having higher persistence rates than part-time students (Fike & Fike, 2008). In addition, students with high levels of enrollment continuity are more likely to earn an associate's degree. Those who had high levels of enrollment intensity and consecutive terms of full-time enrollment are more likely to transfer to a four-year institution (Crosta, 2014).

Although the research establishes an important connection between enrollment status and academic outcomes, consideration of the mesosystemic interactions between the high school, family, and community college microsystems provide additional insights into why these chaotic enrollment patterns exist. The following example will serve as an illustration.

Family/Community College Mesosystemic Interaction

Within the context of the community college microsystem, one study found that students are less likely to apply for financial aid as compared to their peers at four-year institutions (McKinney & Novak, 2013). This is significant because students filing a FAFSA had 79% higher odds of persisting than students who did not file. Part-time students who filed had 100% higher odds of persisting than part-time students who did not file. It was especially surprising to learn that 42% of community college students who would be eligible for a Pell Grant did not file a FAFSA (McKinney & Novak, 2013). It is necessary to turn to the family microsystem for possible explanations (and possible interventions). Since community colleges serve a high

proportion of first-generation students (Morest, 2013), it is likely that families lack the knowledge and experience to navigate complex college admissions process (Clemens, 2016). Further cultural beliefs may be a factor. For example, McKinney and Burrige (2015) found that Latino students are more reluctant to take out student loans than their White or African American peers. These findings suggest some very actionable items including FAFSA information sessions at college fairs and early outreach to parents to provide accurate information about FAFSA filing (McKinney & Novak, 2013).

Conclusions

As a population, community college students face many barriers to retention and completion (Pellegrino & Hoggan, 2015). In fact, community college students have six times more exposure to the risk factors associated with attrition as compared to their peers at four-year colleges and universities (Pellegrino & Hoggan, 2015). This literature review examined the problem of low retention rates among community college students. Because the factors contributing to this problem of practice are complex, ecological systems theory (Bronfenbrenner, 1979; Neal & Neal, 2013) provided a useful framework for organizing these factors from general to specific and exploring how they are interrelated. Findings from this literature review suggest that an evaluation of mesosystemic interactions (Neal & Neal, 2013) and their influence on enrollment status will be especially relevant when it comes to identifying the most actionable factors influencing this problem of practice within the context of Nashua Community College.

Chapter 2

Needs Assessment

Nashua Community College (NCC) is one of seven community colleges within the Community College System of New Hampshire. A comprehensive community college located in Nashua, New Hampshire, NCC offers 35 associate's degree and 22 certificate programs. Total enrollment in fall 2017 was 1,798 students. Demographics at NCC reflect limited racial/ethnic diversity. The majority of students, 74%, identify as White. Only 9% identify as Hispanic, 2% as Asian, and fewer than 2% as Black.² In terms of gender, 52% of the students are female and 48% are male. Although students range in age from 13 to 74 years, 70% of the student body is 25 years old or less (Nashua Community College, 2018). It is important to note that nearly 70% of NCC students attend college on a part-time basis (National Center for Education Statistics, 2018). This chapter will describe a needs assessment conducted to examine the problem of low retention rates within the context of NCC.

Preliminary observations conducted at NCC during the spring 2018 semester suggested that a lack of student engagement (Tinto, 1975) could be an important factor contributing to inconsistent enrollment patterns and low retention rates. Tinto's (1975) model identified both social integration and academic integration as aspects of student engagement. During these observations, it was possible to operationalize the construct of social integration by counting the number of students engaged in conversation with a peer. The physical isolation and lack of interpersonal communications observed, suggests the level of social integration among NCC students is low (see Appendix A). Although these observations served as a good starting point,

² The race/ethnicity for the remaining percentage of NCC students was not reported/unknown.

additional research was necessary to establish the extent to which a lack of social and academic integration (Tinto, 1975) may influence the retention rates of NCC students.

Purpose of the Study

As noted in the previous chapter, NCC's challenges with student degree completion and transfer rates mirror national trends (Bailey et al., 2015). The goal of this needs assessment was to establish the extent to which the same factors described in the literature affect student enrollment patterns at NCC. More specifically, this study evaluated the mesosystemic interactions between the high school, family, and NCC microsystems to identify the most relevant factors influencing this problem of practice. The following research questions guided this study.

Research Questions

Quantitative Questions

RQ1. To what extent is a community college student's academic success (as measured by degree completion or transfer) related to student enrollment status (full-time versus part-time) in the first semester?

RQ2. To what extent are certain demographic groups (e.g. race/ethnicity, gender, age, SES) more likely than others to attend community college on a part-time rather than a full-time basis?

RQ3. Is there a significant difference in the level of faculty-student interaction based on student enrollment status?

RQ4. Is there a significant difference in the level of support for learners based on student enrollment status?

Qualitative Question

RQ5: What factors do NCC students emphasize as affecting their choices to enroll in courses?

Methods

Research Design

To answer these questions, this study adopted a sequential explanatory mixed methods design (Buck et al., 2009; Creswell, 2013). This means that qualitative research followed quantitative data collection and analysis. The strength of this approach is the use of qualitative analysis to provide further explanation of quantitative results (Creswell, 2013).

Three objectives guided this study. First, I evaluated the relationship between enrollment patterns and academic outcomes of NCC students who first enrolled in the fall of 2014. Second, I analyzed Community College Survey of Student Engagement (CCSSE) results from spring 2017 to determine if two of the factors identified in the literature—the quality of faculty/student interactions and the level of support for learners—are positively associated with the enrollment patterns of NCC students. Finally, I conducted a focus group consisting of three NCC students to explain the quantitative findings and to identify additional factors not noted in the literature review.

Quantitative Data Collection and Analysis

Quantitative data collection occurred in two phases. In phase one, I analyzed de-identified student level institutional data from NCC to establish the relationship between factors identified in the literature and student enrollment patterns at NCC. In phase two, I examined results from the spring 2017 Community College Survey of Student Engagement administered to NCC students to explore the association between student engagement and enrollment decisions.

Phase 1 sample. The sample of students included in phase one of quantitative data collection consisted of 500 first time freshmen who enrolled at NCC in fall 2014. Because other studies use three years (or 150% time to graduation) as a benchmark to measure student success outcomes such as degree completion or transfer (Bailey et al., 2015; Wood et al., 2015), the fall 2014 cohort was selected for the phase one sample. In terms of demographic characteristics, 366 students (73.2%) identified as White; 441 students (90.2%) were 25 years of age or younger; 192 students (38.4%) were Pell grant recipients. In addition, there were slightly more males than females enrolled in classes (males = 274 students and females = 226 students). Further, these students appeared to possess college-ready skills. Out of 500 students, only 61 students (12.2%) enrolled in two or more developmental courses. It is also important to note that 264 students (52.8%) attended class on a full-time basis (taking 12 or more credits) while 236 students (47.2%) were part-timers.

Phase 1 instrumentation. To answer the first and second research questions, I operationalized the dependent variable of academic success as either transfer to a four-year college or completion of an associate degree (or both). Next, I operationalized factors identified in the literature review as independent variables to investigate how these factors might influence student outcomes (see Table 1 for description of each independent variable).

Phase 1 data collection and analysis. I submitted a request to NCC's institutional researcher asking for a report on first-time freshmen who enrolled at NCC in fall 2014. Using data stored on Banner (the college's student information system), the institutional researcher produced an Excel spreadsheet with de-identified student level information organized by the variables listed in Table 1. I downloaded this spreadsheet into SPSS and conducted cross-tabular analyses to answer RQ1 and RQ2.

Table 1

Measuring and Operationalizing Constructs

Construct	Definition	Indicators	Citations
Dependent variable			
Academic success	A student's achievement of established academic goals	Transfer to a 4-year institution, associate degree completion (each coded as <i>yes/no</i> in the administrative dataset)	Calcagno, Bailey, Jenkins, Kienzl, & Leinbach (2008), Crisp & Delgado (2014), Dowd & Melguizo (2008), Wang (2009)
Independent variables			
Enrollment Status	Whether a student attends college full- or part-time	Number of credits enrolled per semester (students enrolled for at least 12 credits are full time)	Crosta (2014), Fike & Fike (2008), Juskiewicz (2017)
Socioeconomic status	A student's income level	Pell Grant eligibility (coded as <i>yes/no</i> in the dataset)	Hollifield-Hoyle & Hammons (2015), McKinney & Burridge (2015)
Other demographic factors	Student demographic characteristics including race, ethnicity, gender, and age	Standard demographic variable measures	Bukoski & Hatch (2016), Clemens (2016), Pellegrino & Hoggan (2015), Wilson (2014)
College readiness	A student's high school preparation—ability to complete college-level work	Number of developmental courses student enrolled in	Crisp & Delgado (2014), Clemens (2016)

Phase 2 sample. During the second phase of quantitative data analysis, I used a stratified random sample of 503 NCC students who completed the CCSSE survey in spring 2017. To create this sample, NCC provided CCSSE with a spring 2017 class list. CCSSE next divided the classes into morning, afternoon, and evening groups. CCSSE then randomly selected classes to

survey from each of these groups. Given the size and randomness of this sample, it was preferable to draw upon this secondary dataset rather than conduct a separate primary source survey with fewer students.

Phase 2 instrumentation. As noted above, preliminary observations suggested that student engagement could be an important factor influencing student enrollment patterns at NCC. Academic integration is one aspect of student engagement (Tinto, 1975). A review of the literature revealed two common indicators used to operationalize this construct (see Table 2). First, the quality of faculty-student interaction (Lysne & Miller, 2017; Mitchell & Hughes, 2014; Tovar, 2015); and second, available support for the learner (Gupton, 2017; Kennamer et al., 2009; Smith & Allen, 2014).

Table 2

Operationalizing and Measuring the Construct of Student Engagement

Indicator	Citations	Measure
Quality of faculty–student interactions	Lysne & Miller (2017), Mitchell & Hughes (2014), Tovar (2015)	Six questions from 2017 CCSSE linked to faculty-student interaction benchmark
Institutional support for learners	Gupton (2017), Kennamer, Katsinas, Hardy, & Roessler (2009), Smith & Allen (2014)	Seven questions from 2017 CCSSE linked to student support benchmark

Note. See Center for Community College Student Engagement (2017) for a complete list of CCSSE survey questions. CCSSE = Community College Survey of Student Engagement.

The CCSSE survey is an existing instrument used to measure the construct of academic integration. This instrument aligns well with the indicators identified in the literature since two of the benchmarks measured by CCSSE are student-faculty interaction and support for learners (Center for Community College Student Engagement, 2017; McClenney, Marti, & Adkins, n.d.).

To establish the reliability and validity of this instrument, McClenney et al. (n.d.) shared findings from three research studies that “validate CCSSE’s use of student engagement as a proxy for student academic achievement and persistence” (p. 5). It is interesting to note that these studies only established a positive correlation between variables. It is important to remember these findings do not establish causation (Lochmiller & Lester, 2017).

Phase 2 data collection and analysis. NCC’s institutional researcher downloaded results from the 2017 CCSSE survey into an Excel spreadsheet. The Center for Community College Student Engagement had previously removed all personal identifiers from the dataset, so the research remained in compliance with HIRB protocol. Because specific questions on the CCSSE survey are linked to the benchmarks associated with academic integration (see Appendix B), it was possible to use SPSS software to answer research questions three and four by utilizing descriptive and inferential statistics. It is important to note that student academic data from Banner could not be linked to individual level student responses from the CCSSE survey. This is because NCC received no personally identifiable student information with CCSSE survey results.

Qualitative Data Collection and Analysis

One shortcoming of quantitative data analysis is its inability to answer the *why* questions (Smallwood, 2014). For this reason, I adopted a sequential explanatory mixed methods design (Creswell, 2013). Because qualitative data collection and analysis follow quantitative research, it may be possible to gain additional insights into the factors contributing to this problem of practice. According to Curry (2015), qualitative research “uses inductive approaches . . . to generate novel insights into phenomena that are difficult to measure quantitatively” (4:58). For the purpose of this study, I chose a focus group approach (Krueger, 2002; University of Derby,

2013) to gather primary data. This decision was due to time considerations. With the end of the spring 2018 semester fast approaching, it would have been difficult to arrange three separate student interviews lasting one hour each.

Sample. The sample was a convenience sample consisting of three NCC students. One student was completing her first year of study, and two students were preparing to graduate with their associates' degrees. Although it was not my original intent to interview graduating seniors, this convenience sample provides a valuable opportunity to hear the perspectives of individuals representing one of the academic success metrics identified in this study (i.e., associate's degree completion). I initially identified these participants with the help of the Student Senate Advisor. These students assisted with my cognitive interviewing assignment and all agreed to take part in a qualitative research project later in the semester

Instrumentation. The qualitative research question guided development of the focus group interview schedule (see Appendix C). To allow for comparison with quantitative findings, I aligned some of the questions with specific factors identified in the literature (e.g., work schedule; Boswell & Passmore, 2013; Dundes & Marx, 2007). To allow for the discovery of new factors influencing student enrollment decisions, I provided several open-ended questions. For example, "If you could do one thing to increase transfer and degree completion rates at NCC, what would it be?" I based design of the interview schedule on best practices for conducting focus groups (Krueger, 2002; University of Derby, 2013).

Data collection and analysis. To protect the anonymity of student participants, I followed the terms of the informed consent document. I also verbally reviewed these terms at the beginning of the focus group session. Further, the terms of this research project were within the parameters established by the HIRB blanket protocol (e.g., less than 1,000 adult participants,

focus group of between 45 and 60 minutes, limited to audio recording only). Because Nashua Community College has its own ethical research board (ERB), the ERB also reviewed and approved the terms of this research. Students in the sample received an email invitation with a copy of the informed consent form to review. To make participation more convenient for students, the focus group took place before graduation rehearsal. It was one hour in length and it followed the interview schedule outlined in Appendix C.

Upon completion of the focus group, I transcribed the recording and removed all references to student first names. To ensure the trustworthiness of data and interpretations, I followed up with focus group participants via email to allow for member-checking (Lochmiller & Lester, 2017). Participants recommended no changes or additions to the transcript.

To analyze the focus group transcript, I adopted an inductive approach (Miles et al., 2014). This means I began with no established codes or themes for my First Cycle of coding (Miles et al., 2014). Instead, I read through the interview transcript and looked for words or phrases that could be associated with the constructs of enrollment continuity or enrollment intensity. I used a process of descriptive coding to highlight the text and make a list of terms summarizing key ideas (Miles et al., 2014). For each code, I developed a definition, selected a representative quote, and added a note to document my thought process. To complete my Second Cycle of coding (Miles et al., 2014), I read through the transcript again. This time I began to look for patterns and relationships linking the descriptive codes.

Findings

Research Question 1

RQ1: To what extent is a community college student's academic success (as measured by degree completion or transfer) related to student enrollment status (full-time versus part-time) in the first semester?

To answer this question, I identified those students in the sample who enrolled as full-time students in their first semester. Next, I calculated the percentage of those students who neither earned an associate's degree nor transferred after three years; those who earned an associate's degree after three years; those who transferred after three years; and those who both earned an associate's degree and transferred after three years. As a comparison, I completed similar calculations using students who attended part-time during the first semester. Results of cross-tabular analyses appear in Table 3. This information was valuable because it allowed me to assess the extent to which the enrollment patterns identified in the literature (Crosta, 2014; Fike & Fike, 2008) may also influence academic outcomes at NCC.

Quantitative analysis of institutional data revealed that a student's academic success at NCC is strongly associated with enrollment status during the first semester. In other words, students who enrolled in 12 or more credits during their first semester at NCC were more likely to graduate or transfer than students who enrolled in less than 12 credits during their first semester (see Table 3). Descriptive statistics showed that 55.3% of student who took 12 or more credits during their first semester at NCC graduated and/or transferred within three years. In comparison, only 28.3% of part-time students (those taking fewer than 12 credits in their first semester) graduated and/or transferred after three years.

Table 3

Academic Outcomes Based on Enrollment Status in First Semester

Academic outcome	Enrollment status		Total
	Full time	Part time	
Did not graduate or transfer			
Count	118	169	287
%	44.7	71.6	57.4
Graduated with no transfer			
Count	41	25	66
%	15.5	10.6	13.2
Transferred with no graduation			
Count	65	40	105
%	24.6	16.9	21.0
Graduated and transferred			
Count	40	2	42
%	15.2	0.8	8.4
Total			
Count	264	236	500
%	100.0	100.0	100.0

Note. Full-time students were enrolled in 12 or more credits in their first semester. Part-time students were enrolled in fewer than 12 credits in their first semester.

In addition, inferential statistics provided evidence of the relationship between enrollment status in the first semester and the academic outcomes of liberal arts students at Nashua Community College. Academic outcomes (e.g., graduation and/or transfer) served as the dependent variable and enrollment status (e.g., full-time versus part-time) was the independent variable. Pearson Chi Square testing revealed a statistically significant association between the variables (Sig. = .000; $p < 0.05$). Further, Cramer's V testing indicated the association between the variables was strong (Cramer's V = .322). This finding is in keeping with the research that shows a positive

association between full-time enrollment and academic success outcomes such as persistence, graduation and transfer (Crosta, 2014; Fike & Fike, 2008).

Research Question 2

RQ2: To what extent are certain demographic groups (e.g. race, ethnicity, gender, age, SES) more likely than others to attend community college on a part-time rather than a full-time basis?

To answer this question, I used SPSS to complete cross tabulations of different demographic variables with the enrollment status variable. In the case of age, race/ethnicity, and college readiness, it was first necessary to recode variables to facilitate quantitative analysis. My goal was to discover possible associations between a student’s individual characteristics and his or her enrollment patterns. Results of cross-tabular analyses appear in Tables 4–8.

Table 4

Cross Tabulation of College Readiness and Enrollment Status

	Number of developmental education courses					
Enrollment	0	1	2	3	4	Total
Full time						
Count	161	89	13	1	0	264
%	59.4	53.0	26.0	10.0	0.0	52.8
Part time						
Count	110	79	37	9	1	236
%	40.6	47.0	74.0	90.0	100.0	47.2
Total						
Count	271	168	50	10	1	500
%	100.0	100.0	100.0	100.0	100.0	100.0

Note. The college readiness variable, “Dev Ed,” is represented by the number of developmental courses a student was enrolled in (i.e., 0, 1, 2, 3, or 4). A student was considered full-time if he or she enrolled in 12 or more credits per semester.

Table 5

Cross Tabulation of Age and Enrollment Status

Enrollment	Age in years		Total
	≤25	≥26	
Full time			
Count	246	14	260
%	55.8	29.2	53.2
Part time			
Count	195	34	229
%	44.2	70.8	46.8
Total			
Count	441	48	489
%	100.0	100.0	100.0

Table 6

Cross Tabulation of Race/Ethnicity and Enrollment Status

Enrollment	Race/ethnicity		Total
	White	Non-White	
Full time			
Count	189	75	264
%	51.6	56.0	52.8
Part time			
Count	177	59	236
%	48.4	44.0	47.2
Total			
Count	366	134	500
%	100.0	100.0	100.0

Note. Non-White students self-identified as belonging to one of the following groups: Asian ($n = 12$, 2.4%), American Indian/Alaska Native ($n = 2$, 0.4%), Black or African American ($n = 8$, 1.6%), Hispanic ($n = 21$, 4.2%), Native Hawaiian/Pacific Islander ($n = 1$, 0.2%), or two or more races ($n = 11$, 2.2%). Seventy-nine of the non-White students (15.8%) did not specify race or ethnicity.

Table 7

Cross Tabulation of Socioeconomic Status and Enrollment Status

Enrollment	Pell Grant		Total
	No	Yes	
Full time			
Count	153	109	262
%	51.2	56.8	53.4
Part time			
Count	146	83	229
%	48.8	43.2	46.6
Total			
Count	299	192	491
%	100.0	100.0	100.0

Note. Nine responses were missing from the dataset. Because Pell Grants are awarded to low-income students, Pell eligibility is an indicator of socioeconomic status. One limitation of this indicator is that it likely undercounts the number of low-income community college students. For example, McKinney and Novak (2013) found that 42% of community college students who would have been eligible to receive Pell Grants never filed a Free Application for Federal Student Aid form.

Table 8

Cross Tabulation of Gender and Enrollment Status

Enrollment	Gender		Total
	Female	Male	
Full time			
Count	116	148	264
%	51.3	54.0	52.8
Part time			
Count	110	126	236
%	48.7	46.0	47.2
Total			
Count	226	274	500
%	100.0	100.0	100.0

A review of descriptive statistics indicated the demographic characteristics of freshman students in the fall 2014 cohort align with institutional data reported to National Center for Education Statistics (2018) in fall 2017. The majority of NCC students self-identify as White and they tend to be young—25 years of age or less. Further, there is a fairly even balance between male and female students enrolling in NCC programs. There is one noteworthy exception when comparing datasets. According to the National Center for Education Statistics (2018), 70% of NCC students attended college on a part-time basis (taking less than 12 credits each semester) in fall 2017. Freshman who enrolled at NCC in fall 2014, however, had a higher enrollment intensity in their first semester with 264 students or 52.8% of the cohort taking classes full-time. This finding suggests that students begin with strong momentum in the first semester (Attewell & Monaghan, 2016), but then momentum tapers off and enrollment intensity decreases. This is a concern for NCC because part-time students have higher attrition rates as compared to those students who enroll full-time (Crosta, 2014; Fike & Fike, 2008; Juskiewicz, 2017). When thinking about possible interventions, this is evidence that a program targeting first semester students might have the greatest effect on academic outcomes by encouraging students to maintain their full-time status.

After completing a series of cross tabulations to compare the dependent variable of enrollment status with several independent variables associated with student characteristics, I reviewed the results to see if any of these characteristics appeared to be associated with students' enrollment decisions. As shown in Tables 4–8, enrollment status was not strongly related to individual characteristics.

College readiness and age were the two independent variables that seemed to have some relationship to enrollment status (see Tables 4 and 5). Even though students enrolled in one

developmental education course were more likely to be full-time, enrollment intensity decreased as the number of developmental courses a student was taking increased (see Table 4). This finding is further evidence that participation in developmental education can decrease the odds of successful transfer or degree completion (Bailey, 2009; Crisp & Delgado, 2014). In addition, students 26 years and older were more likely to attend college on a part-time basis as compared to younger students (see Table 5). This is not surprising given that many older students have a number of responsibilities outside the classroom (Pellegrino & Hoggan, 2015). Dependent care, for example, can make it difficult for older learners to successfully balance the demands of school and family. Although college readiness and age appear to have some influence on the enrollment status of NCC, it is important to note the number of students taking two or more developmental courses was relatively small (12.2%). Further, less than 10% of students the fall 2014 cohort were over 26 years of age. As a result, it will be most effective to design an intervention that targets an entire cohort of first semester students as opposed to one specific group.

Research Question 3

RQ3: Is there a significant difference in the frequency of faculty-student interactions based on student enrollment status?

Six questions on the 2017 CCSSE survey are associated with the faculty-student interaction benchmark (see Appendix B), so it was possible to compare how full-time and part-time students at NCC viewed the frequency of their interactions with professors. In this case, enrollment status was the independent variable. Out of 461 students who provided valid responses (N=461), there were 257 students who self-reported their status as full-time (n=257) and 204 students who self-reported their status as part-time (n=204). Faculty-student interaction

was the dependent variable used to answer this question. To represent this variable, I calculated a total interaction score by adding up student responses to the six questions on the CCSSE survey linked to the faculty-student interaction benchmark. It was possible to quantify the results since students rated the frequency of interactions with faculty using a Likert scale (e.g., 1= “Never;” 2= “Sometimes;” 3= “Often;” 4= “Very Often”). The minimum total interaction score reported by a student was seven and the maximum score was 24.

Once I identified the variables, I used SPSS software to gather descriptive and inferential statistics to compare the difference between the two groups. First, I calculated the mean interaction score for full-time students and the mean interaction score for part-time students. Next, I decided to use an independent samples t-test to determine if the difference between the mean interaction scores was statistically significant. I chose this test because the sample was independent (e.g., full-time and part-time students), the level of measurement was ordinal, and the data was normally distributed. As shown in Table 9, the mean interaction score for full-time students ($M=14.350$) was slightly higher than the mean interaction score for part-time students ($M=13.412$). I conducted an independent samples t-test to determine if this difference in the mean interaction scores was statistically significant (see Table 10). Results showed there was a statistically significant difference between the groups ($p= .003$).

Quantitative analysis found a significant difference in the frequency of faculty-student interactions based on student enrollment status. Although the mean interaction score was moderate, full-time students at NCC perceived a higher frequency of faculty-student interactions ($M=14.350$ out of 24) than part-time students ($M=13.412$ out of 24). These results are not surprising; however, they serve to validate findings from the literature review within the context of NCC.

Table 9

Frequency of Faculty–Student Interaction Based on Student Enrollment Status

Enrollment status	<i>n</i>	Interaction score	
		<i>M</i>	<i>SD</i>
Part time	204	13.412	3.439
Full time	257	14.350	3.323

Note. Analyses excluded cases with missing data for any one of the items. Comparable analyses using calculation of means across all items found almost identical results. Interaction score represents the frequency of faculty–student interaction reported by Nashua Community College students completing the Community College Survey of Student Engagement in spring 2017. The total interaction score was calculated by adding up student responses to six questions linked to faculty–student interaction benchmark on the survey (see Appendix B). It was possible to quantify the results because students rated the frequency of interactions with faculty using a Likert scale (1 = *never*, 2 = *sometimes*, 3 = *often*, and 4 = *very often*). Total interaction scores ranged from a minimum of 7 to a maximum of 24.

Table 10

Two-Tailed Test for Equality of Means for Faculty–Student Interaction

Variable	<i>t</i>	<i>df</i>	<i>p</i>
Interaction score	–2.965	459	.003*

**p* < .05.

First, studies have shown that the quality of faculty-student interactions is a factor directly associated with student success outcomes (Clemens, 2016; Mitchell & Hughes, 2014; Nakajima et al., 2012; Tovar, 2015). Because full-time students at NCC were almost twice as likely to transfer or graduate as part-time students (see Table 3), it follows that the frequency of faculty-student interactions may be a factor contributing to differences in academic outcomes based on student enrollment patterns. Further, an intervention designed to increase number of full-time students could have positive impact on the frequency of faculty-student interactions. Second, Mitchell and Hughes (2014) noted that the classroom is the main point of contact for

community college students. Findings from this needs assessment reinforce this idea and point to a classroom-based intervention as an effective approach for increasing retention rates at NCC.

Research Question 4

RQ4: Is there a significant difference in the level of support for learners based on student enrollment status?

To answer this question, I examined the seven questions from the 2017 CCSSE survey associated with the student support benchmark (see Appendix B). This data allowed me to compare how full-time and part-time students at NCC perceive the level of institutional support for learners. In this case, enrollment status was the independent variable. Out of 469 students who provided valid responses (N=469), there were 261 students who self-reported their status as full-time (n=261) and 207 students who self-reported their status as part-time (n=207). Student support was the dependent variable used to answer this question. To represent this variable, I calculated a total support score by adding up student responses to the seven questions on the CCSSE survey linked to the student support benchmark. It was possible to quantify the results since students rated the level of student support using a Likert scale (e.g., 1= “Never;” 2= “1 time;” 3= “2-4 times;” 4= “5 or more times”). The minimum total interaction score reported by a student was seven and the maximum score was 28.

Once I identified the variables, I used SPSS software to gather descriptive and inferential statistics to compare the difference between the two groups. First, I calculated the mean support score for full-time students and the mean support score for part-time students. Next, I used an independent samples t-test to determine if the difference between the mean support scores was statistically significant. As shown in Table 11, the mean support score for full-time students (M=15.747) was similar to the mean support score for part-time students (M=15.184). I

conducted an independent t-test to determine if this difference in the mean interaction scores was statistically significant (see Table 12). Results showed there was no statistical difference between the groups (Sig. .125, $p > .05$). There is no significant difference in the level of support for learners based on student enrollment status.

Table 11

Level of Support for Learners Based on Student Enrollment Status

Enrollment status	<i>n</i>	Support score	
		<i>M</i>	<i>SD</i>
Part time	207	15.184	3.874
Full time	261	15.747	4.000

Note. Analyses excluded cases with missing data for any one of the items. Comparable analyses using calculation of means across all items found almost identical results. Support score represents the level of support for learners reported by Nashua Community College students completing the Community College Survey of Student Engagement in spring 2017. The total support score was calculated by adding up student responses to seven questions linked to the support for learners benchmark on the 2017 survey (see Appendix B). It was possible to quantify the results since students rated the level of support for students using a Likert scale (1 = *never*, 2 = *1 time*, 3 = *2–4 times*, and 4 = *5 or more times*). Total support scores ranged from a minimum of 7 to a maximum of 28.

Table 12

Two-Tailed Test for Equality of Means for Support of Learners

Variable	<i>t</i>	<i>df</i>	<i>p</i>
Support score	−1.535	466	.125

Quantitative analysis revealed there is no significant difference in how full-time and part-time students view the level of institutional support available at NCC. Regardless of their enrollment status, NCC students perceived moderate levels of institutional support for learners (Full-time: $M=15.747$ out of 28; Part-time: $M=15.184$ out of 28). This finding is noteworthy

because it appears to clarify a discrepancy noted in the literature review. Although some studies suggest that access to support services such as advising is factor positively associated with academic integration and retention outcomes (Smith & Allen, 2014; Tovar, 2015), other studies contradict this claim (Bukoski & Hatch, 2016; Calcagno et al., 2008; Gupton, 2017; Martin et al., 2014). Bukoski and Hatch (2016), for example, found that some community college students are reluctant to seek support services based on their cultural norms. Given these findings, it may be more productive to focus on interventions in the classroom rather than on interventions associated with student support services.

Limitations of College Survey of Student Engagement Data

An analysis of CCSSE survey data is valuable for this needs assessment because it reveals the extent to which factors associated with student engagement may influence student enrollment patterns at NCC. However, it is important to note two limitations associated with this dataset. First, CCSSE data is based on students' self-reported answers to survey questions. Second, a comparison of CCSSE responses with institutional reporting on enrollment status revealed a discrepancy. Out of 469 NCC students who provided valid responses to the 2017 CCSSE survey, 56% (n=261) self-reported their enrollment status as full-time and 44% (n=207) self-reported their enrollment status as part-time. This is in contrast to the institutional reports that align with guidelines established by the federal government. For example, the registrar's report to the National Center for Education Statistics (2018) indicated that NCC had a full-time enrollment rate of 32% and a part-time enrollment rate of 68% in fall 2017. This discrepancy suggests that NCC students and college personnel do not share a common definition of full-time enrollment status.

Research Question 5

RQ5: What factors do NCC students emphasize as affecting their choices to enroll in courses?

In my first cycle of coding the focus group transcript, I used an inductive process to identify a series of descriptive codes associated with enrollment continuity and enrollment intensity (Miles et al., 2014). For each code, I developed a definition, selected a representative quote, and added a note to document my thought process. In my second cycle of coding (Miles et al., 2014), descriptive codes were grouped into two categories—factors that promote enrollment continuity and factors that discourage enrollment continuity. Enrollment continuity is defined as a student taking classes in consecutive semesters without interruption (Klempin, 2014). Table 13 shows the results of the qualitative analysis.

Limitations of Qualitative Analysis

One important limitation of the qualitative analysis is that it only involved three students. Further, these three students were actively involved in the Student Senate at NCC. Most NCC students do not have the same high level of participation in extra-curricular activities. As a result, the focus group participants may display higher levels of social integration based on Tinto's (1975) model of college student retention than the typical NCC student.

Discussion

The purpose of this needs assessment was to evaluate the mesosystemic interactions between the high school, family, and NCC microsystems to identify the most relevant factors influencing this problem of practice. Using a sequential explanatory mixed methods approach, a number of findings emerged from the quantitative and qualitative analysis. These findings are

significant because they will guide the next phase of research into possible interventions for the problem of low retention rates among NCC students.

Table 13

Factors Influencing the Enrollment Decisions of Nashua Community College Students

Factors the promote enrollment continuity	Factors that discourage enrollment continuity
Affordable tuition	Limited financial resources
Convenient location of college	Misalignment of student and faculty/staff expectations
Interaction with advisors	Conflicting work and class schedules
Self-awareness	Community college stigma—disapproval of family/friends
Extracurricular activities	Family responsibilities
High school preparation—dual enrollment programs	Lack of clearly defined goals Gaps in high school preparation—weak academic skills
Role model for younger siblings	Lack of certainty about credit transfer to 4-year school
Quality interactions with faculty	Poor interactions with faculty
Peer support	Low quality course materials

Note. Enrollment continuity is defined as a student taking classes in consecutive semesters without interruption (Klempin, 2014). Codes were developed from a focus group interview of three Nashua Community College students on May 16, 2018.

Quantitative Results

As noted above, a student's academic success at NCC appears to be strongly associated with enrollment status during the first semester. These findings are in keeping with the research that shows a positive association between full-time enrollment and academic success outcomes such as persistence, graduation, and transfer (Attewell, Heil, & Reisel, 2012; Belfield, Jenkins, & Lahr, 2016; Crosta, 2014; Fike & Fike, 2008). These results suggest that an intervention

encouraging first semester students to enroll in at least 12 credits per semester may have the greatest impact on improving degree completion and transfer rates at NCC.

Further, a review of descriptive indicates that first semester students in the fall 2014 cohort had higher levels of enrollment intensity than institutional averages. This finding suggests that most NCC students tend to take 12 or more credits in the first semester. After that, enrollment intensity tapers off and more students transition to part-time status. (The exception is those students enrolled two or more developmental education courses or students over the age of 26.) It follows that the most effective intervention to increase retention rates at NCC will be one that targets all first semester students and encourages them to maintain their full-time status in subsequent semesters.

An analysis of student engagement indicators based on enrollment status revealed some relevant findings. First, student perceptions of full-time enrollment likely differ from institutional definitions. This is significant because students may believe they are enrolled in college on a full-time basis; however, they are taking an insufficient number of credits per semester to complete their programs in a two-year timeframe. This increases the likelihood of attrition (Attewell et al., 2012). Regardless of this discrepancy, there are still two noteworthy findings about student engagement based on students' perceptions of their enrollment status. On the one hand, NCC students who report themselves as full-time appear to have higher levels of faculty-student interactions than students who see themselves as part-time. In terms of academic outcomes, more faculty-student interaction likely contributes to higher levels of integration and increased student persistence rates (Mitchell & Hughes, 2014; Tinto, 1975, 2012). On the other hand, there appears to be no difference in the perceived level of institutional support for learners based on enrollment status. These findings suggest a classroom-based intervention may have a

greater effect on increasing student engagement and influencing enrollment decisions than an intervention aimed at student support services such as academic advising. These results are aligned with the findings of Mitchell and Hughes (2014), who noted that the classroom is the main point of contact for community college students who tend to be part-time and live off campus.

Qualitative Results

As shown by the descriptive statistics, NCC students tend to have higher levels of enrollment intensity in the first semester than in subsequent semesters. Qualitative analysis helps to explain these results by identifying a variety of factors that influence the enrollment patterns of NCC students. These factors include social integration (Tinto, 1975, 2012), high school preparation (Crisp & Delgado, 2014), individual student characteristics (Calcagno et al., 2008), and family encouragement (Pellegrino & Hoggan, 2015). In addition, three factors may be especially relevant when identifying actionable interventions to address this problem of practice within the context of NCC. These include financial considerations, the quality of faculty-student interactions, and the alignment of student and institutional expectations.

The first factor is the financial pressure associated with the cost of college attendance (Hicks et al., 2014; Hollifield-Hoyle & Hammons, 2015). Beyond tuition and fees, this includes the costs associated with the purchase of textbooks and other course materials (Hilton & Wiley, 2011; Whitford, 2018). Although none of the NCC students specifically mentioned the high price of textbooks during the focus group interview, they made it clear that financial considerations played a key role in affecting their enrollment choices. Two of the students in the focus group stated that low tuition was the primary reason they chose to attend NCC. Another student enrolled at NCC to avoid the burden of student debt. Further, it is likely that financial

considerations prevent NCC students from completing an associate's degree within a two-year timeframe. For two of these students, the necessity of outside employment led to scheduling conflicts between work and school. One student described how her work in a day care center prevented her from enrolling in classes on a full-time basis. As a result, it took her longer to complete her degree because she was unavailable when required courses were scheduled. A second student explained that the number of hours she worked during her first semester negatively impacted her academic performance because she had little time to devote to homework.

The second factor affecting student enrollment patterns at NCC is related to student engagement levels. More specifically, all focus group participants commented on the importance of faculty-student interactions (Mitchell & Hughes, 2014; Nakajima et al., 2012). A lack of engagement in the classroom, for example, could easily have negative consequences on student persistence. As one student observed about her professor:

You are reading off a PowerPoint or a piece of paper in your hand. I have no idea what you're saying. I'm staring out the window. I'm staring out the hallway—not going to lie, I'm probably playing on my phone while you're talking because I don't care anymore.

Conversely, there is likely a positive effect on student retention and enrollment continuity if a student perceives that a faculty member cares about her learning (Mitchell & Hughes, 2014). According to one focus group participant, “those professors are what makes NCC where I want to be.”

Third, a misalignment of student expectations with institutional expectations appears to be another factor influencing the enrollment choices of NCC students. Academic policies that seem very clear to faculty and staff are often less apparent to students (Bailey et al., 2015).

During the focus group, for example, all participants expressed uncertainty about the number of credits they had accumulated. Although NCC administration recognizes the importance of full-time enrollment in terms of student persistence (Fike & Fike, 2008) and advisors actively encourage students to sign up for 15 credits per semester or 30 credits per year (Complete College America, n.d.), each of the focus group participants was unsure about the number of credits she had earned during the spring semester. According to one student, “I took four classes, but I’m not sure how many credits for each class.” This misalignment of expectations could conceivably explain the discrepancy noted in the quantitative portion of the needs assessment regarding student enrollment status. Further, this misalignment could lead to lower enrollment intensity per semester, increased time to graduation, and lower retention rates (Attewell et al., 2012). These findings suggest the need for clearer communications and the establishment of shared expectations about academic outcomes between NCC personnel and students. Although none of the focus group participants disclosed that they were first generation college students, setting clear benchmarks is especially important for this population. This is because first generation students typically lack the family support necessary to successfully navigate the complex processes often associated with higher education (Ishitani, 2006; Morest, 2013).

Conclusions

A needs assessment conducted at NCC during the spring of 2018 confirmed that a student’s enrollment status, particularly during the first semester, is strongly associated with outcomes such as associate’s degree completion and transfer rates. Further, financial pressures, student engagement levels in the classroom, and the communication of institutional expectations appear to be key factors affecting the enrollment decisions of NCC students. The next chapter

will review the intervention literature to identify a possible solution to the problem of low retention rates at NCC.

Chapter 3

Intervention Literature Review

Four key findings emerged from the needs assessment study conducted at Nashua Community College (NCC). First, it appears that increasing the number of credits students complete in the first year could potentially have a positive impact on graduation and transfer rates at NCC (Crosta, 2014; Fike & Fike, 2008; Juszkievicz, 2017). Second, financial concerns appear to be a powerful factor influencing the enrollment decisions of NCC students (Hicks et al., 2014; Hollifield-Hoyle & Hammons, 2015). Third, the quality of faculty-student interactions at NCC is an important component related to student engagement and persistence (Mitchell & Hughes, 2014; Nakajima et al., 2012). Fourth, NCC faculty and staff will need to improve communications and clarify expectations to ensure more students make the appropriate enrollment decisions to earn an associate's degree or successfully transfer to a four-year institution (Bailey et al., 2015; Kuh et al., 2008). Building upon these findings, this chapter will review the intervention literature through the lens of Bean and Metzner's (1985) model of nontraditional undergraduate student attrition. This approach will make it possible to identify a potential solution for the problem of low retention rates at NCC.

Identifying a Theoretical Framework

At first glance, Tinto's (1975) model of college student retention appears to provide a relevant theoretical framework for evaluating possible interventions associated with this problem of practice. Tinto (1975) proposed that student persistence is based on an individual's level of integration with both the academic and social systems of a college. Academic integration is measured by the student's ability to meet established grade expectations as well as develop appropriate intellectual norms aligned with the institutional culture. Social integration, on the

other hand, is developed through peer associations, participation in extracurricular activities, and exchanges with faculty and staff both inside and outside of the classroom. According to Tinto (1975), “The higher the degree of integration of the individual into the college systems, the greater will be his commitment to the specific institution and to the goal of college completion” (p. 96).

Needs assessment findings from NCC reinforce the importance of social integration as a factor promoting student persistence and enrollment continuity. Each of the focus group participants reported an active involvement in extracurricular activities including student government. Further, each student described the positive influence of these activities on the development of social connections and a commitment to NCC. One student summed it up this way:

So the two years before this year, I pretty much just went to work, came here, and went home. And now this year, I've met these guys and we do so much stuff together. . . . It makes it so it's like a second family now. . . . It makes it easier to come to school and it makes it easier to actually enjoy coming to school!

The Shortcoming of Tinto's (1975) Retention Model

In spite of the powerful effects of social integration described by the three focus group participants, other evidence suggests their experience is not typical among NCC students. For example, observations of student activity in January 2018 revealed low levels of social integration. The researcher made the following notes while observing student interactions in the cafeteria on Tuesday, January 30, 2018:

When I arrive, ten students are seated individually around the room. Most are listening to headphones while using phones or computers. . . . One student purchases a beverage and

a breakfast sandwich. He sits and eats alone. A few students stop at the vending machines.

Around 9:50 am, activity picks up a bit as students are passing through or getting up to go to class. By 9:52 am, the area is nearly deserted. (Appendix A)

During their interview, the focus group participants also commented on their classmates' lack of involvement in extracurricular activities. One student reported, "Ours is such a small group of people. We pretty much see the same group of people every other Tuesday when we meet. And with our other clubs like Rotaract, it's only eight of us." Another student suggested that a perceived stigma associated with community college attendance may discourage the social integration of some NCC students.

Because no one's goal is to go to a community college. They want to go to a like a higher school, I guess. . . . A friend of ours actually told us this—he said he doesn't like it here because no one talks to each other. Everyone's miserable—no one wants to be here.

These findings are aligned with Mitchell and Hughes (2014), who note that most community college students have few opportunities for social integration because they tend to enroll part-time, live at home, work off campus, and participate in few extracurricular activities. Further, these findings suggest that theoretical models developed for students attending four-year colleges and universities may need to be adapted to fit the community college context. According to Martin et al. (2014), Tinto's (1975) model of college student retention has limited relevance for community college students since there are few opportunities for academic and social integration outside of the classroom.

Bean and Metzner's (1985) Model of Nontraditional Undergraduate Student Attrition

Bean and Metzner's (1985) model of nontraditional undergraduate student attrition appears to provide an alternative theoretical framework that is more appropriate for the community college context. Nontraditional students typically display one or more of the following characteristics—they are over the age of 24, reside off campus, and attend classes on a part-time basis (Bean & Metzner, 1985). Based on this definition, all of the students at NCC fit into the nontraditional category because there are no dorms on campus and 68% of total students are classified as part-time (National Center for Education Statistics, 2018). Bean and Metzner described the limitations of Tinto's (1975) model as follows:

The most influential theoretical contributions to understanding the student attrition process, those of Spady (1970), Tinto (1975), and Pascarella (1980), relied heavily on socialization . . . to explain the attrition process. One defining characteristic of the nontraditional student was the lack of social integration into the institution; therefore, a different theory must be used to link the variables in this model. (Bean & Metzner, 1985, p. 489)

In Bean and Metzner's model of nontraditional student attrition, the influence of social integration variables on retention is minimized. Environmental variables, on the other hand, play a much greater retention role for nontraditional students than they do for traditional students who attend four-year colleges and universities. Other factors influencing the retention rates of nontraditional students include background and defining variables, academic variables, psychological outcomes, and academic outcomes.

Potential Interventions to Improve Retention and Completion Rates at Nashua Community College

When NCC needs assessment data is viewed through the lens of Bean and Metzner's (1985) model, a useful framework for evaluating intervention literature emerges. The next section of this chapter will discuss a series of promising interventions for the problem of low retention and completion rates at NCC. Each intervention will be examined within one or more of the following components of Bean and Metzner's model: defining variables, environmental variables, and psychological outcomes. As noted above, these components have been identified as more relevant predictors of attrition for nontraditional students, including community college students, than those intended to evaluate students attending four-year colleges and universities (Bean & Metzner, 1985).

Defining Variable: Enrollment Status

In Bean and Metzner's (1985) model, enrollment status is a defining characteristic of nontraditional students because they often choose to attend college on a part-time basis. This is significant because studies have found a close association between student enrollment status and measures of academic success including persistence, degree completion, and transfer (Crosta, 2014; Fike & Fike, 2008; Juskiewicz, 2017; Klempin, 2014). Enrollment status can be defined in two ways—enrollment intensity and enrollment continuity (Crosta, 2014; Klempin, 2014). Enrollment intensity refers to the number of credits a student attempts per semester and this determines a student's full-time or part-time status (Crosta, 2014; Klempin, 2014). It is important to note that colleges have typically defined a full-time course load as 12 credits per semester based on federal financial aid requirements (Klempin, 2014). Although enrollment intensity is positively associated with persistence, degree completion, and transfer (Crosta, 2014; Fike &

Fike, 2008; Klempin, 2014), community college students are more likely to attend school on a part-time basis than their peers at four-year institutions (Boswell & Passmore, 2013; Fike & Fike, 2008). The needs assessment data reported a similar trend with 68% of all NCC students classified as part-time (National Center for Education Statistics, 2018).

Enrollment continuity refers to a student taking courses in consecutive semesters without interruption (Klempin, 2014). Although community college students with high levels of enrollment continuity are more likely to earn an associate's degree, enrollment patterns tend to be very irregular for most students (Crosta, 2014). For example, only 1.2% of community college students attend class in a traditional pattern of fall-spring-fall-spring with full-time enrollment each semester (Crosta, 2014). Results from the qualitative portion of the needs assessment suggest a similar pattern exists among NCC students. According to one focus group participant:

I've only taken two (classes per semester) except for this year. I've only ever taken two classes at a time based on my schedule at work. I never thought I'd be able to do more because I just can't focus on that many things at one time. Then I was working like three jobs, but it's just too much for me to handle. And then, this year I kind of forced myself to take three classes each semester so I could graduate this spring. It wasn't horrible.

Directly related to enrollment status is the concept of momentum (Belfield et al., 2016). Momentum is when a student attempts 15 credits in the first semester of college as opposed to 12 credits (Belfield et al., 2016). It appears a community college student's level of momentum, or enrollment intensity during the first semester, has an especially important influence on academic outcomes (Attewell et al., 2012; Attewell & Monaghan, 2016; Belfield et al., 2016). For example, Attewell et al. (2012) found that community college students who took fewer than 12 credits in the first semester were 8-13 percent less likely to earn their associate's degree than

students who took 12 or more credits in the first semester. These findings align with the quantitative results of the needs assessment that traced graduation and transfer rates of the fall 2014 cohort at NCC (see Table 3). Further, community college students who took 15 credits in the first semester were 9 percentage points more likely to graduate than those who took 12 credits (Attewell & Monaghan, 2016).

Based on this information, it appears an intervention targeting the enrollment intensity of first semester students may have the greatest effect on improving degree completion and transfer rates at NCC. A review of the literature identified 15 to Finish campaigns as a promising intervention that addresses this specific issue. These campaigns are purposefully designed to prompt college students to attempt a minimum of 15 credits per semester (or 30 credits per year) so they have the momentum to complete their degrees on time (Complete College America, n.d.).

15 to Finish campaigns. As noted above, federal financial aid guidelines define full-time status as enrollment in 12 credits per semester. Although individuals taking 12 credits believe they are full-time students, they are unable to complete an associate's degree in two years at this enrollment intensity. Further, the additional time to degree completion leads to greater educational costs (Belfield et al., 2016) and increases the likelihood that students will drop out (Complete College America, n.d.). Among community colleges in the University of Hawaii system, for example, an average of 8% of first-time freshmen enrolled in 15 or more credits between 2009 and 2011 (University of Hawai'i System, 2017). Also, it was estimated that each additional year to graduation in the Hawaii system cost students extra tuition and lost wages totaling \$40,861 (University of Hawai'i System, 2016).

The original 15 to Finish campaign was a communications plan launched in 2012 by the University of Hawai'i System to boost the enrollment intensity of undergraduate students to 15

credits per semester or 30 credits per year (Complete College America, n.d.). This was a concerted effort to change established definitions of enrollment status with slogans like, “taking 12 credits is full-time, but taking 15 credits is on time” (University of Hawai‘i System, 2017, p. 2). The campaign targeted both external and internal stakeholders with the 15 to Finish message. Strategies included creating a branding theme; identifying effective messages for different audiences; developing a website; using data to secure stakeholder buy-in; and revamping the student orientation (Mongold & Itano, 2017). By 2017, the percentage of first-time freshmen taking 15 or more credits had doubled to 19% among Hawaii’s community college students (University of Hawai‘i System, 2017). Furthermore, the success of this initiative had captured the attention of college administrators around the country. As of 2019, 25 states and more than 200 colleges have launched similar campaigns to increase the enrollment intensity of their students (Complete College America, n.d.).

In addition to the communications campaign, the University of Hawai‘i System developed an incentive plan to encourage students to enroll in 15 or more credits per semester. The system worked in conjunction with the college bookstores to offer this incentive. The plan allowed any freshman who earned at least 30 credits in his or her first year and maintained a 2.0 average a chance to win a semester of free textbooks. In 2014, there were 19 winners selected out of 1,300 eligible students (Leong, 2014). Other systems have developed their own incentive plans (Complete College America, n.d.). At Indiana University, for example, administrators have designed a banded tuition program to make it easier for students to pay for additional credits. With banded tuition, students pay the same tuition for a range of credits. At Indiana University, for example, students taking 12 credits pay the same tuition as students taking 18 credits.

Because there are no financial penalties for taking more courses, students are more likely achieve the momentum necessary to graduate on time (Indiana University, 2019).

Summary of the enrollment status variable. As noted by Bean and Metzner (1985), enrollment status is an important defining variable linked to nontraditional student attrition. Because nontraditional students typically attend college on a part-time basis, they are less likely to graduate as compared to students who attend on a full-time basis (Crosta, 2014; Fike & Fike, 2008; Juskiewicz, 2017; Klempin, 2014). It follows that an intervention encouraging community college students to maintain their enrollment continuity while increasing their enrollment intensity, particularly during the first semester, may have the greatest effect on improving degree completion and transfer rates at NCC. Further, needs assessment data from NCC suggests there is a lack of clear communication between college personnel and students when establishing expectations about full-time enrollment. As a result, students could believe they are full-time when, in fact, they lack the enrollment intensity to graduate within a two-year timeframe. This, in turn, could lead to increased educational costs and higher attrition rates (Attewell et al., 2012; Belfield et al., 2016). Based on this evidence, it appears a communication plan similar to the 15 to Finish campaign could be an effective intervention to address the problem of low retention and completion rates at NCC.

In terms of limitations, it is unclear how much incentive plans such as bookstore promotions and banded tuition influenced the outcomes of 15 to Finish campaigns in Hawaii and Indiana. It is likely the presence of these variables magnified the intervention outcomes by inflating the percentage of first year students who took 15 or more credits. Within the context of this problem of practice, it is doubtful a similar incentive plan would be financially viable. For example, the bookstore promotion would require additional financial resources. Banded tuition

would also be beyond the scope of this project since tuition at NCC is set by the board of trustees governing the Community College System of New Hampshire. Although it is possible a 15 to Finish campaign could have a positive influence on the enrollment status of NCC students, it would be prudent to expect more modest results than those reported in Hawaii or Indiana due to the absence of a comparable incentive plan.

Environmental Variable: Finances

A second set of variables that predict the attrition rates of nontraditional students is linked to the student's environment (Bean & Metzner, 1985). Environmental variables are significant because nontraditional students typically live off campus and attend college on a part-time basis. As a result, their enrollment decisions tend to be heavily influenced by external factors including financial considerations, encouragement from family and friends, hours of employment, or family responsibilities. Bean and Metzner (1985) explained the importance of environmental variables this way: "If students cannot make adequate child care arrangements, or adjust their work schedules, or pay for college, they will not continue in school regardless of good academic support" (p. 492).

Needs assessment data from NCC suggests that financial considerations are particularly relevant for NCC students. As noted above, each of the focus group participants chose to attend NCC for financial reasons. Further, the literature suggests that the cost of attendance is a serious barrier to persistence for many community college students (Hicks et al., 2014; Hollifield-Hoyle & Hammons, 2015; McKinney & Burrige, 2015). This is likely due to the fact that community colleges tend to serve a higher proportion of low-income students than four-year colleges and universities (Hollifield-Hoyle & Hammons, 2015).

Although institutions offer resources to help students cover the cost of college attendance, McKinney and Novak (2013) found that community college students are less likely to apply for financial aid as compared to their peers at four-year institutions. This is significant because students filing a Free Application for Federal Student Aid (FAFSA) had 79% higher odds of persisting than students who did not file. Part-time students who filed had 100% higher odds of persisting than part-time students who did not file. It was especially surprising to learn that 42% of community college students who would be eligible for a Pell Grant did not file a FAFSA (McKinney & Novak, 2013).

It appears a second environmental variable, family influence (Bean & Metzner, 1985), may offer a possible explanation for this lack of access to financial aid benefits (Clemens, 2016; McKinney & Burrridge, 2015). Because community colleges serve a high proportion of first-generation students (Morest, 2013), it is likely that families lack the knowledge and experience to navigate complex college admissions process (Clemens, 2016). Further, cultural beliefs may be a factor. For example, McKinney and Burrridge (2015) found that Latino students are more reluctant to take out student loans than their White or African American peers. Loan avoidance was definitely a motivating factor for one of the focus group participants at NCC. Although she did not identify her cultural background, she clearly stated how family values shaped her financial choices: “Let's be honest, my family is cheap. We don't want loans and we're trying to pay as much out-of-pocket for it (tuition) as we can. And my entire time here at NCC has been out-of-pocket—that would not be possible if I had started elsewhere.”

These findings suggest that an intervention targeting the financial barriers associated with college attendance may have an effect on improving degree completion and transfer rates at NCC. If more students completed a FAFSA form (McKinney & Novak, 2013), for example, they

would likely receive additional financial support to increase their enrollment intensity and continuity. A review of the literature identified a promising intervention that used text messaging as a strategy to nudge students and influence their behavior (Bird et al., 2017; Castleman & Page, 2014).

Text messaging campaigns. Nudging refers to “behaviorally-informed messaging campaigns that . . . help people overcome informational and behavioral barriers” (Bird et al., 2017, pp. 1–2). Nudging campaigns have proven to be a low-cost intervention that result in improved educational outcomes for students (Bird et al., 2017; Castleman & Page, 2014, 2016). In one study, researchers used text messaging as a tool to increase the number of low-income students transitioning from high school to college (Castleman & Page, 2014). Castleman and Page (2014) used a multi-site randomized controlled trial to compare how a text messaging campaign and a peer mentoring program influenced college matriculation rates among low-income high school graduates. The texting campaign provided information about pre-matriculation tasks and access to advising. The peer mentoring program provided personal communications and messages of support from near-aged peers already enrolled in college. Although both nudging programs had positive impacts on college matriculation rates, the texting campaign was found to be particularly effective for low-income students with few academic planning supports and less developed college plans (Castleman & Page, 2014).

Two studies specifically examined the effects of text messaging campaigns to increase FAFSA filing rates (Bird et al., 2017; Castleman & Page, 2016). Using a randomized control trial, Bird et al. (2017) sent messages to 450,000 high school seniors between October 2015 and February 2016. Messages used three different tactics to nudge lower-income and first-generation students to complete a FAFSA. The first message emphasized the financial benefits that come

from filling out a FAFSA. The second message associated FAFSA completion with a positive student identity such as “You’re the kind of student who cares about your future” (Bird et al., 2017, p. 7). The third message centered on prompts for completing each step of the FAFSA process. The study found that nudges providing concrete planning prompts were most effective in improving college enrollment results. For example, students who received planning prompts to guide FAFSA completion were 1.1% more likely to enroll in college as compared to control group students. The percentage was slightly higher (1.7%) for first-generation students (Bird et al., 2017).

In the second study, Castleman and Page (2016) conducted a randomized control trial to examine how a texting campaign to increase FAFSA filing rates among college freshmen influenced retention. There were 808 first-time freshmen included in the sample. After sending a series of 12 text messages to the treatment group, the researchers found a significant increase in the spring to fall retention rates of community college students. In fact, those students who received the text reminders about FAFSA filing were almost 12 percentage points more likely to continue into their second year than those who did not receive the texts. Conversely, the texting campaign had no effect on the persistence of freshmen enrolled at four-year institutions (Castleman & Page, 2016). These findings align well with Bean and Metzner’s (1985) framework because they illustrate the importance of financial considerations in influencing the enrollment decisions of nontraditional students.

Summary of finance variable. Unlike their peers who attend four-year colleges and universities, the persistence rates of nontraditional students are strongly influenced by environmental factors (Bean & Metzner, 1985). A review of the literature and needs assessment data indicate that financial considerations may be especially relevant in terms of this problem of

practice. As a result, a text messaging campaign to nudge NCC students to complete a FAFSA form could be an effective strategy to increase degree completion and transfer rates at NCC. Further, the content of this messaging campaign should focus on concrete planning prompts (Bird et al., 2017). One advantage of this proposed intervention is the low cost. According to Bird et al. (2017), a similar message campaign cost \$.50 per student. Castleman and Page (2016) reported a cost of \$5 per student. Another advantage of this intervention is its flexibility. Nudging with text messaging appears to be a strategy that can be used successfully to shape a variety of student behaviors (Castleman & Page, 2014, 2016).

Psychological Outcome: Satisfaction

A third set of factors that predict the attrition rates of nontraditional students is tied to psychological outcomes (Bean & Metzner, 1985). These psychological outcomes are largely shaped by academic and environmental variables (see Figure 1). The first outcome, stress, could stem from pressures associated with the student's academic workload or from the student's personal problems. Regardless of the source, stress is negatively associated with nontraditional student persistence (Bean & Metzner, 1985). Utility is the second psychological outcome. It refers to student perceptions about the usefulness of their college program in terms of achieving career goals or promoting personal development. The third outcome is goal commitment. This is defined as the student's level of determination to graduate from college. Satisfaction is the fourth psychological outcome. It relates to the extent a student enjoys taking classes and being a college student. The latter three outcomes are all positively associated with nontraditional student persistence (Bean & Metzner, 1985).

Based on needs assessment data, it appears satisfaction is a particularly important psychological outcome influencing student enrollment decisions at NCC. Further, satisfaction

seems to be closely associated with the quality of faculty-student interactions and the level of student engagement (Mitchell & Hughes, 2014; Tovar, 2015). As noted earlier, each of the focus group participants commented on the importance of faculty-student interactions when determining their satisfaction with a particular course. On the one hand, faculty experience and content knowledge appear to affect the quality of faculty-student interactions. One student described her math professor this way: “But honestly, with this one statistics professor, he said he worked at IBM. You couldn't convince me that he ever used statistics before this class.” A second student responded that she decided to drop statistics as a result of this same professor. According to her, “I think I had him for like two days. And then I dropped it because I said I'm not taking stats—it's not required.”

On the other hand, pedagogy appears to be another factor influencing the quality of faculty-student interactions. For example, each of the focus group participants expressed a dislike of teacher-centered methodologies, such as reading off PowerPoint slides, which tend to minimize the level of student engagement. When one student encountered a professor who frequently read lecture notes from a piece of paper, she provided the following feedback: “As a student who can't focus on what you're talking about, you need to engage me more.” These results are aligned with studies that establish the quality of faculty-student interactions as an important indicator of student retention (Clemens, 2016; Mitchell & Hughes, 2014; Nakajima et al., 2012). For example, Mitchell and Hughes (2014) found that students who experienced more student-instructor interactions were 1.11 times more likely to persist than their peers.

These findings suggest that an intervention aimed at raising the level of student satisfaction at NCC could have a positive influence on this problem of practice. Further, the most effective interventions will likely be classroom-based and focus on increasing student

engagement. A review of the literature identified a potential intervention designed to increase student engagement through changes in pedagogy (Lysne & Miller, 2017; Price & Tovar, 2014).

Student-centered pedagogy. Using regression analysis, Price and Tovar (2014) found a positive association between graduation rates and levels of student engagement as measured by the Community College Survey of Student Engagement (CCSSE). Further, the CCSSE benchmarks of active and collaborative learning, and support for learners were especially influential. The study concluded with a series of recommendations for increasing student engagement by strengthening faculty-student and student-student interactions. These included requiring students to work together on projects during class; encouraging students to work with classmates outside of class to prepare class assignments; creating opportunities for students to tutor each other, either voluntary or paid; committing faculty time for students to discuss ideas from readings or classes with instructors outside of class (Price & Tovar, 2014, p. 778).

A second study by Lysne and Miller (2017) set out to test the claim by Freeman et al. (2014) that active teaching methods result in knowledge gains and improved knowledge retention as compared to lecture-based instruction in an undergraduate science classroom. Participants in the study included biology majors who enrolled in a yearlong sequence of Biology I and Biology II courses at a comprehensive community college in Idaho. In the treatment group, students engaged in active learning strategies such as activities and discussion. Students in the control group learned the content in a traditional lecture format. Although this study found no differences in knowledge gains or knowledge retention between the control and treatment groups, students in the active learning classroom had lower attrition rates than those in the lecture-based classroom. This result seems to support the findings of other studies that

recognize the importance of faculty-student interactions and student engagement when it comes to persistence (Mitchell & Hughes, 2014; Price & Tovar, 2014; Tovar, 2015).

Summary of psychological outcome. As noted by Bean and Metzner (1985), psychological outcomes are a predictor of persistence among nontraditional college students. A review of the literature and needs assessment data indicates that student satisfaction may be an especially relevant outcome in terms of this problem of practice. Further, the quality of faculty-student interactions (Mitchell & Hughes, 2014) and the level of student engagement (Price & Tovar, 2014) likely serve as indicators of satisfaction. In keeping with these findings, one possible intervention for this problem of practice would be to provide NCC faculty with professional development training in student-centered teaching strategies such as cooperative learning (Banks, 2016). Research suggests that the use of cooperative learning methods improves student-to-student as well as student-to-teacher relationships (Banks, 2016; Price & Tovar, 2014). By increasing levels of student engagement through changes in pedagogy, it is likely that this intervention could raise satisfaction and lead to improved persistence and graduation rates (Bean & Metzner, 1985; Mitchell & Hughes, 2014; Price & Tovar, 2014).

A potential drawback to the successful implementation of this intervention is NCC's heavy reliance on adjunct faculty. As of fall 2017, NCC had 30 full-time faculty and 187 part-time faculty (Nashua Community College, 2018). Many of the part-timers teach on multiple campuses or work other full-time jobs. As a result, scheduling challenges could make it difficult to carry out a successful professional development program. Another drawback involves budgeting. Because the adjunct collective bargaining agreement requires adjunct faculty to be paid \$40/hour for mandated training, implementing a professional development intervention involving over 150 part-time faculty would likely be cost prohibitive.

Addressing Multiple Variables: Open Educational Resources

From Bean and Metzner's (1985) model of nontraditional student attrition, it follows that an intervention simultaneously addressing defining variables, environmental variables, and psychological outcomes would have the greatest impact on students' intent to persist. As a result, the adoption of open educational resources appears to offer a highly effective solution for this problem of practice because this intervention targets enrollment status, finances, and student satisfaction within the same intervention. Open educational resources (OER) are defined as

teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge. (Fischer et al., 2015, p. 160)

Even though OER materials are available for little to no cost, it is important to recognize that research has found no difference in the quality of OER materials compared to commercially produced textbooks (Bliss, Robinson, Hilton, & Wiley, 2013; Fischer et al., 2015).

Dependent variable: enrollment status. Directly related to this problem of practice, one study found that the adoption of OER textbooks increased the number of credits a student completed per semester (Fischer et al., 2015). Further, these gains continued into the consecutive semester (Fischer et al., 2015). In this study, the sample consisted of 16,727 students attending 10 different colleges. There were 4,909 students who enrolled in course sections using OER materials (treatment group) and 11,818 students who enrolled in course sections using commercial textbooks (control group). The study found that students in the treatment group enrolled in more credits during the semester (mean credit load = 13.29) than students in the

control group (mean credit load = 11.14). During the following semester, researchers noted a similar pattern. Here the marginal mean load for treatment group was 10.71 credits and the marginal mean load for control group was 9.16 credits (Fischer et al., 2015). This finding is significant because a positive association between student enrollment intensity (e.g., full versus part-time enrollment) and academic success outcomes has been found in prior studies by Attewell et al. (2012), Belfield et al. (2016), Crosta (2014), and Fike and Fike (2008).

Environmental variable: finances. As previously noted, analysis of needs assessment data suggests that financial pressures are an important factor influencing student enrollment decisions at NCC (Griswold, 2018). These pressures likely stem from rising tuition costs (Kennamer et al., 2009) and the high price of textbooks (Hilton, Robinson, Wiley, & Ackerman, 2014; Hilton & Wiley, 2011). In 2009, for example, the average college student spent \$702 each year on textbooks (Hilton & Wiley, 2011). By fall 2018, the NCC bookstore's website listed a typical freshman's textbook costs at over \$500 for one semester. Because community colleges offer an affordable pathway to higher education, they serve a higher percentage of low-income students as compared to four-year institutions (Hicks et al., 2014). Research suggests that this demographic is much more sensitive to rising tuition costs than their wealthier peers (Fischer et al., 2015). A 2018 survey of 1,651 college students and recent graduates revealed that 46% of respondents said the high cost of textbooks had "a big impact" on their financial situation (Whitford, 2018). Further, a 2012 survey of 22,129 Florida college students indicated that 64% of students chose not to purchase a required textbook due to high cost (Hilton, 2016).

It follows that reducing or eliminating the cost of textbooks could result in improved academic outcomes—particularly for low-income students. In one study at Houston Community College, researchers found that students using an OER psychology textbook outperformed

students using a traditional textbook based on three measures—course GPA, attrition rates, and scores on a standardized psychology exam (Hilton & Laman, 2012). One possible explanation for these gains is that OER removes financial barriers and makes course materials accessible for all students. Researchers who study the effects of OER have termed this the *access hypothesis* (Grimaldi et al., 2019).

Psychological outcome: increased student satisfaction. Beyond the cost savings, adoption of OER materials also has the potential to improve academic outcomes due to increased student satisfaction. In one case study, a group of faculty worked collaboratively to redesign reading and mathematics courses at Mercy College (Pawlyshyn, Braddlee, Casper, & Miller, 2013). The goal was to increase the retention of first year students through innovative instructional practices using OER materials. In mathematics classes, for example, the faculty adopted an OER curriculum that utilized a flipped classroom model. After the launch of this intervention, the percentage of students passing the class increased from 48.40% to 68.90% (Pawlyshyn et al., 2013). It is likely gains in academic outcomes observed in reading and math courses utilizing OER are a result of increased levels of student satisfaction (Bean & Metzner, 1985). This idea is supported by Bliss et al. (2013), who found that some instructors using OER perceived higher levels of student interest in course materials.

Proposed Intervention

Based on this intervention literature review, it appears an intervention utilizing OER would be the most effective one for improving retention and completion rates at NCC. This is because an OER intervention addresses multiple variables within Bean and Metzner's (1985) including enrollment status, finances, and student satisfaction. Further, by targeting first semester students in a required course such as English composition, this intervention has the potential to

positively impact a large number of NCC students. In terms of intervention design, a case study by Hilton and Laman (2012) provided a useful model.

During the fall 2011 semester, 690 students at Houston Community College used on OER textbook in 23 sections of introduction to psychology (Hilton & Laman, 2012). Faculty measured the efficacy of the OER adoption using three measures: average class GPA, attrition rates, and scores on a standardized departmental final. Data was gathered at the end of the fall semester and compared to baseline data collected during the spring 2011 semester when a traditional textbook was used by students. Results showed that students with access to OER materials in fall 2011 performed better on each measure than students who used traditional materials in spring 2011 (Hilton & Laman, 2012).

The proposed intervention would follow a similar approach at NCC. Instead of introduction to psychology, however, OER materials would be adopted in all sections of English composition for fall 2019. In addition to measures of class GPA, data would be gathered on fall to spring retention as well as enrollment intensity (the number of credits earned per semester). In keeping with the findings of Fischer et al. (2015) and the focus of this problem of practice, the following question could guide program evaluation: How does the adoption of OER materials in an English composition course affect the enrollment patterns of community college students?

One potential drawback involves the increased planning time associated with OER adoption (Bliss et al., 2013). To address this issue, several members of the English faculty may be eligible to receive stipends from the Community College System of New Hampshire for OER development. These individuals then become OER developers and share their materials with other members of the English faculty. It follows that other instructors, or adopters, might be less resistant to using OER as long as they are not required to invest a significant amount of

additional planning time. Bliss et al. (2013) reported that the selection of faculty developers and faculty adopters was an effective implementation strategy used in Project Kaleidoscope—an initiative involving the adoption of OER at eight different community colleges serving at-risk students (Bliss et al., 2013).

Another potential drawback is related to the existing discrepancy between student and institutional definitions of full-time enrollment status. As noted earlier, students are often unclear about the number of credits they accumulate each semester. This is significant because students may believe they are enrolled in college on a full-time basis; however, they are taking an insufficient number of credits per semester to graduate in a two-year timeframe. Although the adoption of OER textbooks has been shown to increase the number of credits earned in a single semester (Fischer et al., 2015), it is unlikely the cost savings realized from this intervention will translate into increased enrollment intensity if students are unsure about the credit requirements needed to graduate on time.

As a result, a second feature of the intervention design will involve a texting campaign to remind all students enrolled in English composition about the benefits of full-time enrollment. The campaign will be launched in two parts. The first message will raise student awareness of enrollment intensity and communicate the benefits of full-time enrollment. This could be similar to Hawai'i's message of “taking 12 credits is full-time, but taking 15 credits is on time” (University of Hawai'i System, 2017). The second part of the campaign will provide a concrete planning prompt to nudge students to register for at least 15 credits in the following semester. A concrete planning prompt is important because Bird et al. (2017) found this approach had a greater influence on changing student behavior than other messaging tactics.

Conclusions

This review of the intervention literature has shown that a two-step intervention involving OER and a text messaging campaign has the greatest potential to positively influence student enrollment patterns at NCC. Aligned with Bean and Metzner's (1985) model of nontraditional student attrition, this intervention will simultaneously provide support to address the rising cost of college attendance (Hicks et al., 2014; Hollifield-Hoyle & Hammons, 2015; McKinney & Burridge, 2015); introduce strategies to increase student engagement (Clemens, 2016; Mitchell & Hughes, 2014; Nakajima et al., 2012; Tovar, 2015); and communicate clear expectations about enrollment intensity and continuity to ensure more students earn an associate's degree or successfully transfer to a four-year institution (Bailey et al., 2015; Kuh et al., 2008). By targeting first semester students in a required general education course, this intervention will potentially benefit the majority of first year students attending NCC and provide them with the momentum necessary to graduate on time (Attewell et al., 2012).

Chapter 4

Intervention Procedure and Program Evaluation Methodology

As noted previously, full-time community college students appear to have higher rates of persistence, transfer and/or degree completion than students who enroll on a part-time basis (Crosta, 2014; Fike & Fike, 2008; Juszkievicz, 2017). Analysis of needs assessment data indicated that three factors are particularly relevant for Nashua Community College (NCC) students when making enrollment decisions: financial pressures, student engagement, and the communication of institutional expectations (Griswold, 2018; Hollifield-Hoyle & Hammons, 2015; McKinney & BurrIDGE, 2015; Mitchell & Hughes, 2014; Nakajima et al., 2012). Based on a review of the intervention literature (e.g., Castleman & Page, 2016; Hilton & Laman, 2012; Mongold & Itano, 2017; Price & Tovar, 2014), I identified a two-phase intervention designed to prompt NCC students to earn more credits by lowering the cost of attendance, increasing the level of student engagement in the classroom, and improving communications between college personnel and students. This chapter describes a program evaluation to assess the extent to which the intervention may be associated with the academic success outcomes and enrollment status of first-year students enrolled at NCC in fall 2019.

Purpose of the Study

The purpose of this study was to evaluate both the process and the outcomes associated with the intervention. Following Leviton and Lipsey (2007), I developed a theory of treatment (see Figure 3) and a logic model (see Appendix D) to clearly illustrate the change mechanism through which I expected the intervention to be associated with specific outcomes. A logic model can be particularly useful in program evaluation because it reveals potential questions and outcome measures to be used in evaluation design (McLaughlin & Jordan, 2010). Using the

theory of treatment and logic model as a framework, this study sought to demonstrate the plausibility of a causal inference associating the inputs and outputs noted in the logic model with a series of short and intermediate outcomes targeting NCC students enrolled in English composition in fall 2019. These expected outcomes included an increase in student engagement, an improvement in the number of students earning a C or better in ENGL 101N, higher GPAs, an improvement in fall to spring retention rates, and an increase in the number of credits attempted in the spring semester. Because the duration of this study was 16 weeks (the length of the fall 2019 semester), it was not possible to evaluate long-term outcomes noted in the theory of treatment such as associate's degree completion or transfer rates to four-year institutions (see Figure 3).

The following research questions guided this study.

Process Evaluation Questions

RQ1. To what extent did ENGL 101N instructors implement the project as planned?

RQ2. To what extent were online OER learning materials accessible to students as planned?

RQ3. To what extent did ENGL 101N students use OER learning materials on a regular basis?

RQ3A. How was the course format (e.g., length of term; online/hybrid, face to face) associated with variation in students' usage of OER learning materials?

RQ3B. How was instructor experience associated with variation in students' usage of OER learning materials? For the purpose of this study, instructor experience is defined as the level of each instructor's familiarity with the no cost textbook (i.e., OER developer or OER adopter).

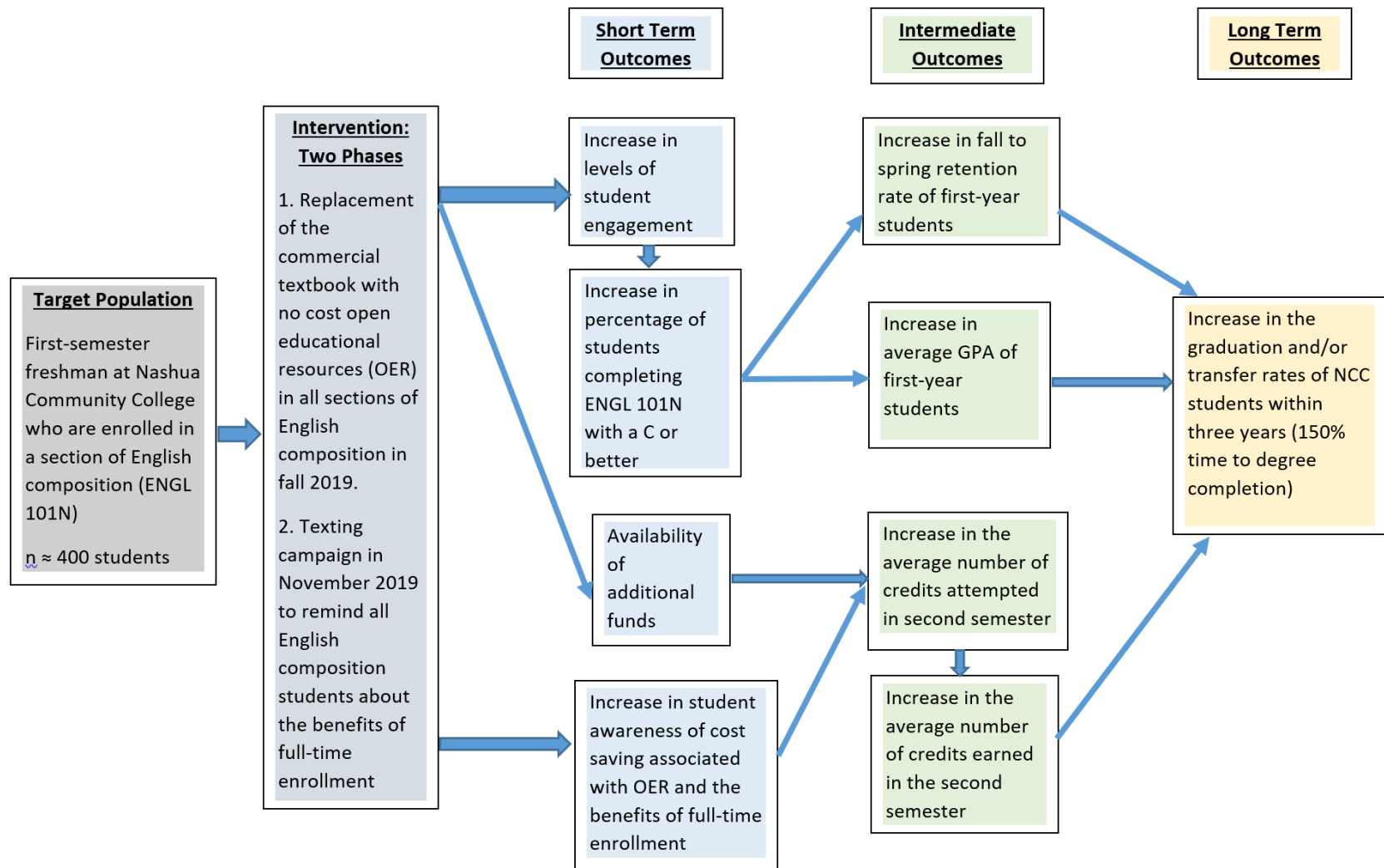


Figure 3. Causal diagram outlining a theory of treatment for the problem of low retention rates at Nashua Community College. Created following the recommendations of Leviton and Lipsey (2007).

RQ4. To what extent was the text messaging campaign delivered as planned?

Outcome Evaluation Questions

RQ5. To what extent was the intervention associated with improved academic success and subsequent enrollment status of students enrolled in ENGL 101N at NCC in fall 2019, compared to outcomes for students in the same course in fall 2018?

RQ5A. How was variation in section format (e.g., length of term; online/hybrid, face to face) associated with variations in the academic success and subsequent enrollment status of ENGL 101N students in fall 2019?

RQ5B. How was variation in instructor experience associated with variations in the academic success and subsequent enrollment status of ENGL 101N students in fall 2019?

RQ6. To what extent does faculty and student focus group data reporting on the use of OER learning materials help explain the outcomes of a treatment program designed to increase the retention rates of first year students at NCC?

Research Design

Given my positionality as a practitioner-scholar, I prioritized the use branch of program evaluation and adopted a pragmatic paradigm when designing an intervention for my problem of practice (Mertens, 2018). According to Mertens (2018), the use branch emphasizes how the results of research studies are used by key stakeholders because “evaluations would not be worth doing if no one used their findings” (p. 16). My purpose was to design a program evaluation that would present credible and compelling evidence to key stakeholders, in this case NCC faculty, to secure their buy-in and encourage them to expand the adoption of OER learning materials in other departments at the college. As a result, my research design included both an evaluation of the intervention’s process as well as an evaluation of the intervention’s outcomes. The process

evaluation examined the extent to which the program performed as intended while the outcome evaluation measured how well the program met established outcomes (Rossi et al., 2004). Both types of evaluation are an essential part of research design because they strengthen the researcher's ability to make valid inferences about program outcomes in non-experimental studies (Shadish et al., 2002).

Process Evaluation

If an intervention is not carried out with a high degree of fidelity, it follows that threats to validity will increase and it will become difficult for the researcher to make strong causal inferences between the treatment plan and program outcomes (Dusenbury et al., 2003; Leviton & Lipsey, 2007; Shadish et al., 2002). As a result, process evaluation is necessary to assess the steps in implementing an intervention, identify procedural barriers, and recommend necessary adjustments to ensure an intervention is delivered as planned (Zhang et al., 2011).

This study focused on three specific criteria for evaluating program performance: project implementation (Stufflebeam, 2003; Zhang et al., 2011); fidelity of implementation—dose (Dusenbury et al., 2003); and barriers (Baranowski & Stables, 2000). These criteria will be described in more detail in the methods section that follows. The study incorporated both quantitative and qualitative methods over the course of the fall semester to analyze each process evaluation indicator.

As a practitioner scholar embedded in my research context, I must be particularly sensitive to the issue of positionality. Positionality is defined as “the location of the researcher in respect of the focus of the research” (Burton, Brundett, & Jones, 2014, p. 27). In my current role as Vice President of Academic Affairs, I oversee all academic programming at NCC, and I am highly invested in efforts to improve student retention rates. On the one hand, it is necessary for

me to acknowledge internal bias so I may maintain my objectivity when interpreting the findings of this study. At the same time, I must recognize the potential impact of my position on research participants (Burton et al., 2014). For example, the English program coordinator is an employee situated within the Academic Affairs division at NCC. Although the English program coordinator does not report to me directly, it is still possible she could feel pressured to perform a certain way if I were to become actively involved in the intervention. For this reason, I scaled back my initial process evaluation plan and chose not to use process evaluation findings to make adjustments during the course of the intervention (Zhang et al., 2011). For example, I decided not to work with the English program coordinator to monitor weekly data on dosage (Dusenbury et al., 2003), and I cancelled a midterm student focus group to check on participant responsiveness (Dusenbury et al., 2003). Instead, I focused my process evaluation on the collection and analysis of data to identify potential limitations in the intervention plan. If the process evaluation reveals the existence of factors that threaten the validity of this study, I will plan to address these threats in future iterations of the intervention. This approach aligns well with the framework of improvement science (Bryk, Gomez, Grunow, & LeMahieu, 2015; Lewis, 2015).

Outcome Evaluation

In keeping with a pragmatic research paradigm (Mertens, 2018), I selected a mixed methods quasi-experimental design for my outcome evaluation because this approach aligns well with my research goals and context. This method embeds the collection, analysis, and synthesis of quantitative and qualitative data into a quasi-experimental quantitative design (Creswell & Plano-Clark, 2018). Another benefit of this approach is it gives me the ability to triangulate quantitative and qualitative findings to strengthen the validity of my results (Mertens, 2018).

I analyzed institutional data to examine the academic success and enrollment status of ENGL 101N students who enrolled in fall 2019 (treatment group) as compared to students who enrolled in the same course in fall 2018 (control group). I was then able to assess possible associations between the intervention and the short and intermediate outcomes noted in the theory of treatment and logic model.

The outcome evaluation did not rely entirely on quantitative methods because they are limited in their ability to explain why specific outcomes have (or have not) occurred (Smallwood, 2014). An important strength of the mixed methods quasi-experimental design is that it allowed me to embed a qualitative strand at the end of my intervention to help explain quantitative findings related to program outcomes (see Figure 4).

Methods

This section discusses the methods used to complete this program evaluation—both process and outcome. This information includes a description of study participants and an explanation of the specific measures used to evaluate each of the indicators and variables identified in the research design.

Participants

ENGL 101N students. The treatment group in this study consisted of 211 first time freshmen enrolled in 18 sections of English composition (ENGL 101N) at NCC in fall 2019 (see Table 14) All student participants were at least 18 years of age, first-time freshmen, and matriculated into an NCC program. The selection of ENGL 101N was significant because this is a first semester, general education course required by all degree programs at NCC. It follows that an intervention targeting ENGL 101N students has to potential to benefit the majority of students attending class at NCC.

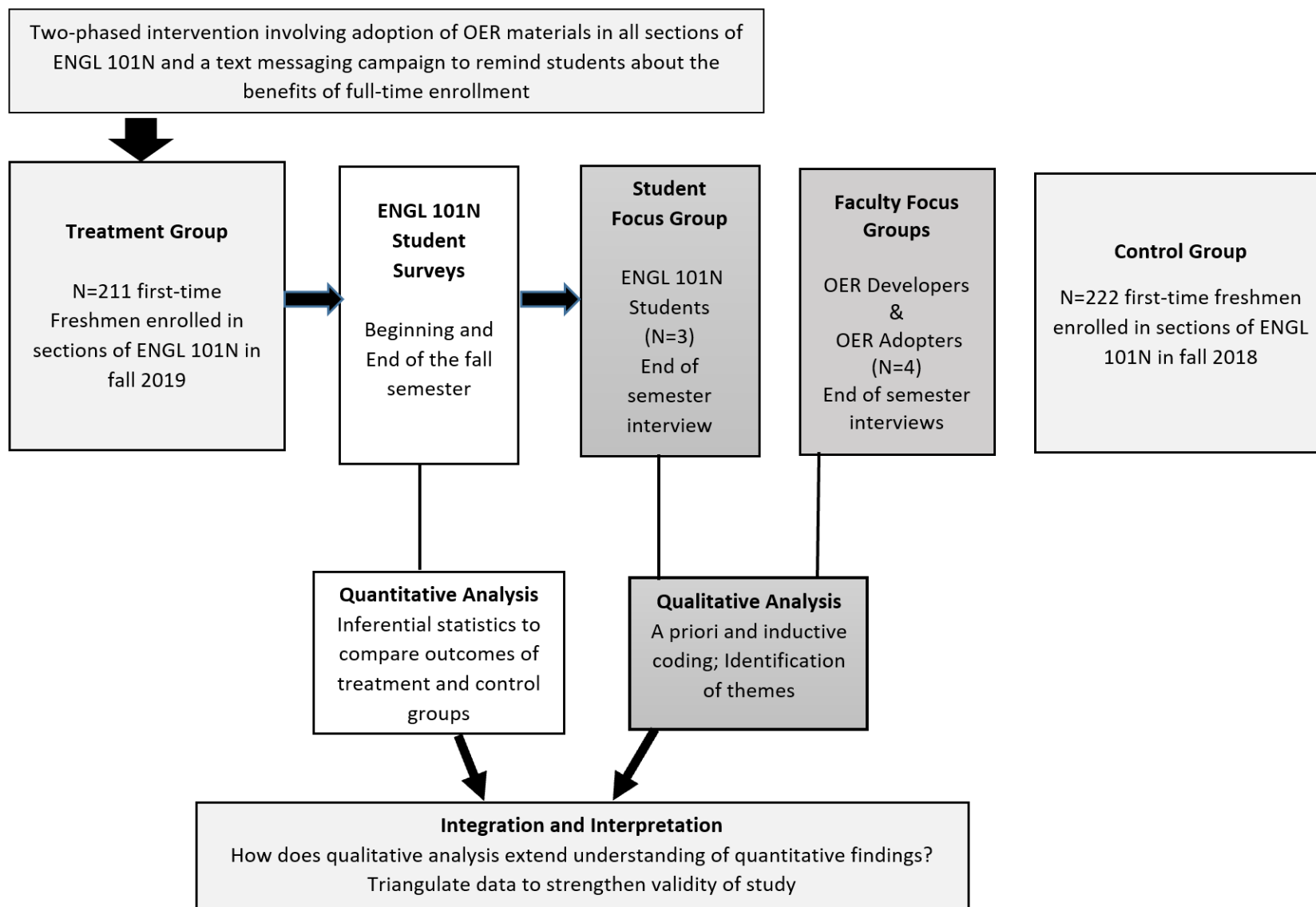


Figure 4. Diagram of a mixed methods quasi-experimental study to evaluate the process and outcomes of an intervention to address the problem of low retention rates among community college students.

Table 14

English Composition Sections Offered at Nashua Community College in Fall 2019

Section	Term	Format	Instructor experience	Number of students completing
1	First 8 weeks	Face-to-face	OER adopter	7
2 ^a	16 weeks	Face-to-face	OER adopter	14
3 ^a	16 weeks	Face-to-face	OER adopter	13
4	Second 8 weeks	Face-to-face	OER adopter	9
A ^a	16 weeks	Face-to-face	OER developer	24
B ^a	16 weeks	Face-to-face	OER adopter	20
C ^a	16 weeks	Face-to-face	OER developer	21
D ^a	16 weeks	Face-to-face	OER adopter	20 ^b
E	16 weeks	Face-to-face	OER adopter	11
F	16 weeks	Face-to-face	OER adopter	11
G	16 weeks	Face-to-face	OER adopter	18
H ^a	16 weeks	Face-to-face	OER developer	21
HYB	First 8 weeks	Hybrid	OER adopter	6
I	16 weeks	Face-to-face	OER adopter	15
J ^a	16 weeks	Face-to-face	OER developer	19
K ^a	16 weeks	Face-to-face	OER adopter	11
L ^a	16 weeks	Face-to-face	OER adopter	23
ZZ	16 weeks	Online	OER adopter	24

Note. OER = open educational resources.

^aIndicates an English composition section that included developmental level students who were also enrolled in a companion corequisite workshop. ^bA new instructor took over ENGL 101N Section D halfway through the semester (at Week 8).

In terms of demographic characteristics, 57.3% (n=121) of students in the treatment group were male and 42.7% (n=90) were female. There was limited racial/ethnic diversity, with 72.5% (n=153) of study participants identifying as White, 12.8% (n=27) identifying as Hispanic, and 8.1% (n=17) identifying as two or more races; 3.8% (n=8). Less than 3% identified as Asian,

Black or African American, or Native Hawaiian or Other Pacific Islander, and race/ethnicity was unknown for 4% of students. About one in three (34.6%) students in the treatment group were Pell grant recipients (receiving a form of financial aid awarded to economically disadvantaged undergraduates). Nearly all students (93.8%) were between 18 and 25 years of age. It follows that the cohort of study participants would be younger than the NCC student population as a whole. This is because the intervention targeted first-time freshmen who tend to be recent high school graduates. In contrast, 71% of the entire NCC student body is under 25 years of age (Nashua Community College, 2018). Further, most study participants appeared to possess college-ready skills. Data indicated that just 21.8% (n=46) of students in the treatment group placed into co-requisite remediation because of low placement test scores. It is also important to note that 72% (n=152) of study participants attended classes on a full-time basis (carried 12 or more credits), while 28% (n=59) of participants were part-timers (taking less than 12 credits). For the purpose of this study, I defined enrollment status based on financial aid guidelines provided by the Community College System of New Hampshire (2019). For example, full-time students are those enrolled in 12 or more credit hours per semester. As noted in Chapter 3, however, community college students must maintain an enrollment intensity of 15 credits or more per semester to graduate in a two-year timeframe (Attewell & Monaghan, 2016; Belfield et al., 2016). Table 15 shows a comparison of the demographic characteristics of ENGL 101N students in the treatment group (fall 2019) and those in the control group (fall 2018). Chapter 5 will report the test of baseline equivalence to evaluate the similarity of the two populations.

ENGL 101N faculty. As shown in the logic model, it is important to recognize that ENGL 101N instructors had two different roles: OER developers and OER adopters.

Table 15

Comparison of Fall 2018 (Control) and Fall 2019 (Treatment) Cohorts of English Composition Students at Nashua Community College

	Term	Total	Gender		Ethnicity/race		Age in years		Corequisite remediation		Enrollment		Pell recipient	
			Male	Female	White	Non-White ^a	18–25	≥26	Yes	No	Full time	Part time	Yes	No
	Fall 2018													
	Count	222	121	101	163	59	211	11	37	185	141	81	88	134
%	100	54.5	45.4	73.4	26.6	95.0	5.0	16.7	83.3	63.5	36.5	39.6	60.4	
87	Fall 2019													
	Count	211	121	90	153	58	198	13	46	165	152	59	73	138
	%	100	57.3	42.7	72.5	27.5	93.8	6.2	21.8	78.2	72.0	28.0	34.6	65.4

Note. With regard to corequisite remediation, Nashua Community College implemented a new placement test (NextGen Accuplacer) and new placement scores starting in January 2019. It is possible the increase in the percentage of corequisite remediation students for fall 2019 may be directly related to the new placement scores.

^aIncludes those who did not self-identify their ethnicity/race.

OER developers are English faculty (one full-time and three part-time) who each received a \$750 stipend to develop and share OER materials. The developers created the OER textbook during the 2018-19 academic year and two of them (one full-time and one part-time) taught sections of ENGL 101N in fall 2019. In addition, the full-time OER developer serves as the English program coordinator and provided oversight of all English courses at NCC during the fall 2019 semester. It should be noted the English program coordinator is viewed as a campus leader of the OER initiative by faculty, staff, and administration. Beyond spearheading the idea to replace the ENGL 101N textbook with free learning materials, she chairs the college's OER committee, and represents NCC on the system wide OER task force.

In contrast to OER developers, OER adopters (N=10) are ENGL 101N instructors (all of them part-time) who replaced the textbook they had been using with OER learning materials starting in fall 2019. It is important to note that all of the OER adopters are experienced ENGL 101N instructors at NCC and they were already familiar with using the ENGL 101N metacourse to share resources on Canvas (the college's online learning management system). The ENGL 101N metacourse is a Canvas course curated by the English program coordinator that contains a wealth of resources for teaching English composition. The metacourse is divided into weekly modules that align with the course calendar. English instructors are also welcome to add their own favorite lessons and resources to the metacourse so these can be shared with colleagues. Although each ENGL 101N instructor is expected to follow the same course calendar and sequence of assignments, they have the flexibility to choose specific activities from the metacourse to download into the weekly modules of their own Canvas course(s). The ENGL 101N metacourse has been in existence for two years and it was originally developed by the English program coordinator to promote resource sharing and ensure greater consistency of

instruction across multiple course sections. In August 2019, OER adopters were required to attend a two-hour workshop where the English program coordinator introduced them to the new OER textbook embedded in the metacourse (see Appendix E). Per the terms of the collective bargaining agreement, adjunct faculty received \$80 for participating in this required training. Prior to the start of the fall semester on August 26, 2019, OER adopters were expected to download the OER textbook from the metacourse into their individual Canvas courses and then select specific readings from the OER textbook to assign to their students. ENGL 101N instructors posted the OER textbook on Canvas as a PDF document with clickable links.

Measures

Process evaluation indicators. The process evaluation assessed three separate components to ensure the intervention was delivered as intended. These included program implementation, dose, and barriers (Baranowski & Stables, 2000; Dusenbury et al., 2003; Stufflebeam, 2003; Zhang et al., 2011). As shown in Table 3, I identified a specific indicator to represent each component within the context of this study. Further, I measured each of these process evaluation indicators using the following instruments: ENGL 101N syllabi, Canvas reports, the Club Texting report, and student surveys.

Project implementation indicator. Project implementation refers to “the extent to which planned activities are carried out” as the intervention was designed (Zhang et al., 2011, p. 65). Because this was a two-phase intervention, there were two components of project implementation. First, I defined project implementation based on the percentage of ENGL 101N section instructors who deployed the no-cost textbook downloaded from the ENGL 101N metacourse and assigned textbook readings on a regular basis to their students via Canvas—the college’s online learning management system. Second, I evaluated project implementation based

on the actual delivery of a text messaging campaign designed to remind students of cost savings associated with OER adoption and to prompt students to take more credits during the spring 2020 semester, using percentage of students to whom the text message was successfully delivered as the implementation measure.

Dose indicator. The dose component of process evaluation considers the participants' level of exposure to the treatment program (Dusenbury et al., 2003). For the purpose of this process evaluation, I defined dose in several ways. The first measure was the percentage of students in each course section who viewed the no-cost textbook at least once during the fall 2019 semester. I also calculated measures of average number of pages viewed by students in each section, and textbook views as a percentage of total home page views.

Barriers indicator. The barriers component of process evaluation refers to specific issues that prevent the intervention from reaching intended participants (Baranowski & Stables, 2000). In the case of this intervention, I defined barriers as a lack of computer and/or Internet access that prevented students from utilizing the OER textbook on Canvas (measured by student survey self-report). This was a key consideration because community colleges typically serve a higher percentage of economically disadvantaged students than four-year institutions (Bailey et al., 2015; Hollifield-Hoyle & Hammons, 2015).

Outcome evaluation variables. The purpose of the outcome evaluation was to assess the extent to which the treatment program was associated with the short and medium program outcomes noted in the theory of treatment and logic model (see Figure 3 and Appendix D)—academic success and enrollment intensity. Further, I identified course format and instructor experience as potential moderating variables affecting program outcomes. I measured each of

these outcome evaluation variables using institutional data collected on every NCC student and administered by the registrar's office.

Academic success—dependent variable. To define academic success, I relied upon the construct of academic integration (Tinto, 1975). As noted in Chapter 3, academic integration is measured by a student's ability to meet established grade expectations as well as develop appropriate intellectual norms aligned with the institutional culture. Higher levels of academic integration are associated with increased retention and completion rates (Tinto, 1975). Aligned with the construct of academic integration, I used several indicators from institutional data to represent the academic success variable including course transferability (earning a grade of C or better in ENGL 101N), fall to spring retention, and fall semester GPA.

Enrollment intensity—dependent variable. As noted in Chapter 3, enrollment intensity refers to the number of credits a student attempts each semester and this construct determines a student's full-time or part-time status (Crosta, 2014; Klempin, 2014). Given that enrollment intensity is positively associated with persistence, degree completion, and transfer (Crosta, 2014; Fike & Fike, 2008; Klempin, 2014), I selected this outcome as another dependent variable in this study.

Moderating variables. I constructed nominal variables for course format and instructor experience with OER materials because I hypothesized these to be moderating variables for program and student outcomes. I coded the format of the ENGL 101N course as two dichotomous variables associated with delivery mode—either online/hybrid or face-to-face, or length of term—either 16 weeks or 8 weeks in length. I also coded instructor experience with the OER learning materials as a dichotomous variable—OER developer or OER adopter. As noted above, OER developers are English composition instructors (one full-time and one part-time)

who developed the free textbook during the 2018-19 academic year. OER adopters (N=10), on the other hand, are ENGL 101N instructors (all of them part-time) who replaced the textbook they had been using with OER learning materials starting in fall 2019.

Procedure

This section provides a description of the intervention, data collection, and data analysis.

Intervention

As discussed earlier, this program evaluation assessed a two-phase intervention to prompt NCC students to earn more credits by lowering the cost of attendance and increasing levels of student engagement. The duration of the intervention was 16 weeks or the length of the fall 2019 semester at NCC. The first phase of the intervention replaced the commercial textbook used in all sections of English composition (ENGL 101N) at NCC with no cost, open educational resources (OER). The second phase of this intervention involved a text messaging campaign to align with the start of the spring registration drive in early November 2019. The purpose of the campaign was to remind ENGL 101N students about the cost savings associated with using a free textbook and to prompt them to register for additional credits during the spring semester. This campaign was an essential component of this intervention because it raised students' awareness of two factors noted in the theory of treatment—the cost savings associated with OER and the benefits of full-time enrollment. Without this nudge (Bird et al., 2017), it is unlikely ENGL 101N students would have considered using textbook savings to take more credits during the spring semester. As noted in Chapter 2, some NCC students do not have a clear definition of full-time enrollment status or the number of credits they need to take each semester to graduate in a two-year timeframe.

Prior to the start of the intervention. The English program coordinator provided ENGL 101N instructors with two hours of professional development training in early August 2019 to familiarize faculty with the OER textbook embedded in the ENGL 101N metacourse. In addition, the English program coordinator shared a model ENGL 101N syllabus and encouraged instructors to select readings from the OER textbook to post in their own course syllabi. Before the start of the fall semester on August 26, 2019, ENGL 101N instructors downloaded the metacourse with the embedded OER textbook into their individual Canvas courses; they redesigned their syllabi to include assigned readings from the OER textbook; they posted their syllabi on Canvas; and they made their Canvas courses available to students.

First 2 weeks of the fall semester. During week one, ENGL 101N instructors provided their students with an introduction to Canvas and the OER textbook. I notified ENGL 101N faculty and students about this research study by posting the recruitment script as an announcement in all sections of ENGL 101N during the second week of classes in August 2019 (see Figure 5).

During the semester. In early November, I worked with the advising center director and our college's public relations officer to launch the second phase of the intervention. We planned a text messaging campaign to align with the start of the spring registration drive that would prompt ENGL 101N students to register for 15 credits or more during the spring semester. Because the size of the text message was limited, the text directed students to more detailed email message that provided registration instructions (see Figure 6). The advising center director sent the email campaign to all ENGL 101N students on Monday, November 4, 2019 and the public relations officer followed up with the text messaging campaign on November 8, 2019. Because the public relations officer used a list of all students enrolled in ENGL 101N in fall

2019 to deliver the text messaging campaign, it targeted more students (N=292) than those included in the treatment group (N=211).

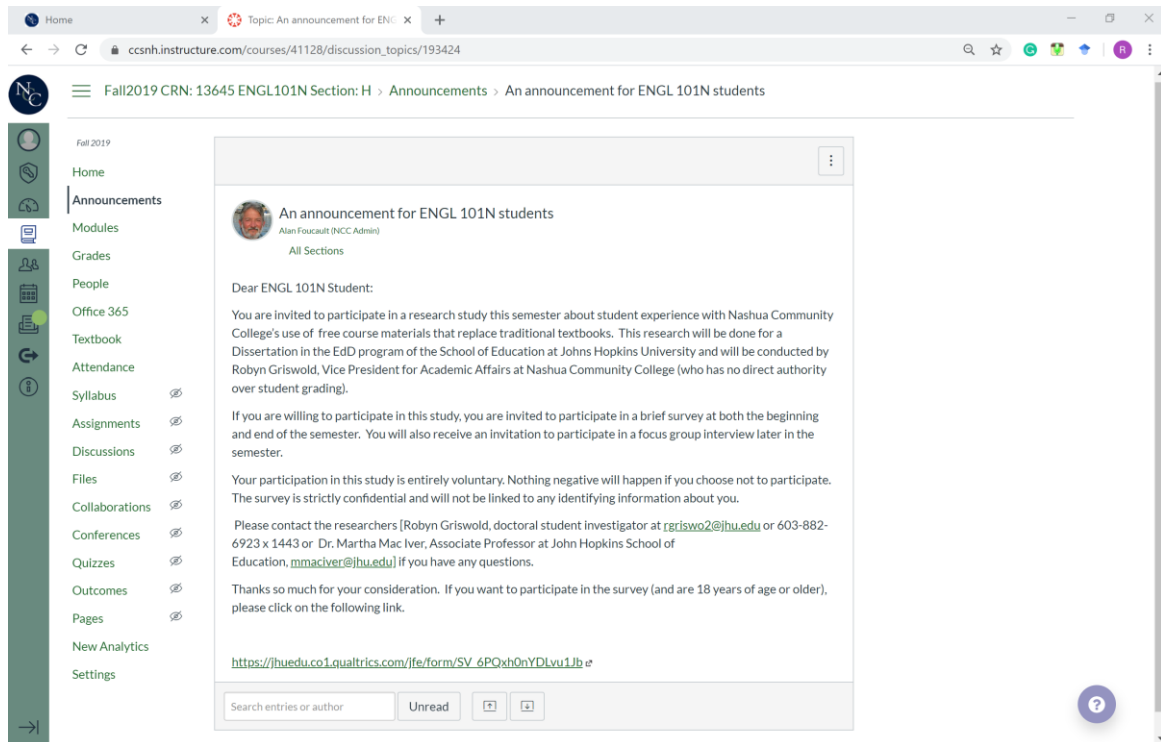


Figure 5. Notice of research study and link to beginning of the semester student survey posted in all sections of ENGL 101N in August 2019.

Email: Hi! It's NCC Advising. You're saving money on textbooks this semester. Congrats! Why not use those savings to take an extra course and stay on track to graduate on time? Registration for winter and spring is now open. Click here to make an appointment with advising _____ or register online at _____. Hurry, classes are filling up fast!

Text: Congrats! You saved \$ on ENGL101 books this term at NCC! Use savings for winter & spring: See email for advisor appt link or call 603.578.8906. 2optout txt STOP

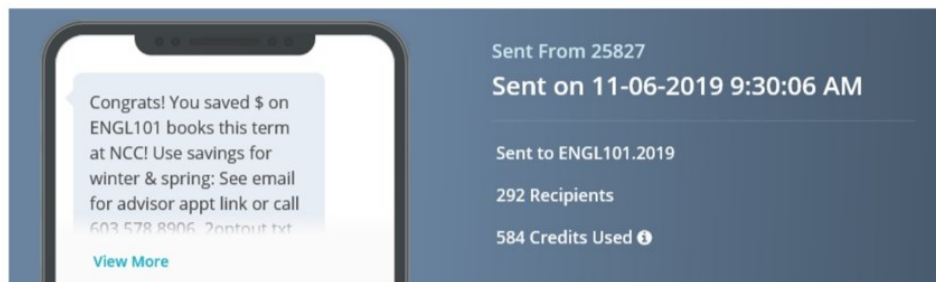


Figure 6. Texting campaign with companion email targeting ENGL 101N students in November 2019.

Data Collection

This section provides more specific information about the data collection instruments and data collection process employed during the evaluation of this treatment program.

ENGL 101N course syllabi. NCC college policy requires that all instructors provide their students with a syllabus at the beginning of every course. Further, all course syllabi must be posted on Canvas. For the purpose of this process evaluation, ENGL 101N syllabi served as a useful instrument to gather data on project implementation. I reviewed the course calendars posted in each syllabus and made note of the number of weeks each instructor assigned a reading from the OER textbook. In this way, I was able to establish the frequency and percentage of ENGL 101N instructors who assigned readings from the OER textbook on a regular basis.

Canvas reports. Reports from the college learning management system (Canvas) served as an important instrument to measure project implementation and dose. For the purpose of this program evaluation, the college's Canvas administrator provided me with access to each of the ENGL 101N Canvas course sites in fall 2019. This access allowed me to run a series of reports by clicking on the "new analytics" link in each course section. These reports provided useful information about each course section including weekly online activity, the level of activity per student, and the average course grade (see Figure 7). For the purpose of this study, I was particularly interested in evaluating the weekly online activity levels of students in each course section. The Canvas report allowed me not only to monitor the average number of Canvas home page views per student each week in each course section, it also allowed me to see which specific resources students were accessing within the course and at what intensity. This information made it possible for me to evaluate students' exposure to the intervention (i.e., OER

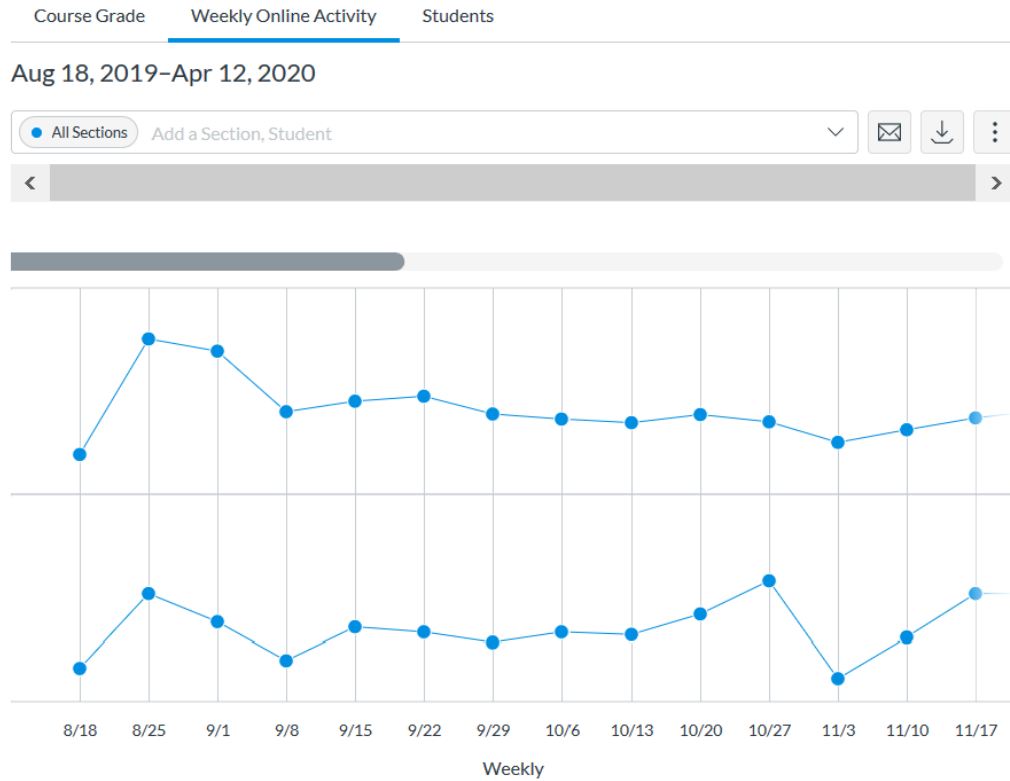
textbook) and to identify any fluctuations in dosage based on course section, course format, or instructor experience.

Student surveys. I surveyed ENGL 101N students twice during the semester. For the beginning of the semester survey, I posted the recruitment script and survey link as a Canvas announcement in all sections of ENGL 101N during the second week of class (see Figure 5). I secured informed consent by including a consent statement at the beginning of the survey. To ensure all participants were 18 years of age or older, the first survey question asked students to identify their age. If any individuals self-identified as 17 years of age or younger, they were taken to the end of the survey and not allowed to answer any additional questions. Student participation in the beginning of the semester survey turned out to be very small with only 12 responses. As a result of this experience, I altered my student recruitment plan for the second survey conducted at the end of the fall semester.

Similar to the beginning of the semester survey, I posted a survey link in the Canvas courses for all sections of ENGL 101N. This time, however, students had class time to complete the survey after they finished filling out their course evaluation forms. (At NCC, students fill out paper course evaluations at the end of each face-to-face course.) As above, I secured informed consent by including a brief consent statement at the beginning of the survey. In addition, the survey identified and excluded participants under the age of 18 with the first survey question. This change in recruitment strategy resulted in a significant improvement in the participant response rate. More specifically, 105 students recorded responses on the end of the semester survey. I collected data for both student surveys using the Qualtrics survey tool.

Average Course Grade 73.51%

COURSE CONCLUDED



Resources			
Resource	Students	Page Views	Participations
Course Announcements	21	492	0
Syllabus Contract	21	117	24
Course Modules	21	1.6k	0
Course Grades	21	1.1k	0
Course Home	21	3.1k	0
photo-1434030216411-0b793f4b4173.jpg	21	1.1k	0
ENGL101 textbook.pdf	21	633	0
writing sample	20	65	18
Process Essay--submit final version here	20	65	20
Grammar Usage Lessons	19	113	16
Course People	19	76	0
Ten percent summary and ACE technique--submit here	19	65	15
Cause and Effect introduction and outline--submit here	18	101	22

Figure 7. Sample new analytics Canvas report downloaded from a fall 2019 ENGL 101N course section.

Text messaging platform report. To collect implementation data on the second phase of the treatment program, I met with the public relations director in mid-November to review the report generated by the text messaging platform. This report showed us the percentage of messages that were successfully delivered to ENGL 101N students as well as those that bounced back or were not sent. In addition, the report indicated how many students took action in response to the text, opted out, or took no action.

Student information system data. Because student level data was an important component of the outcome evaluation, I worked closely with the college's institutional researcher to gather data for the treatment and control groups from the student information system for the short and intermediate term outcomes noted in the theory of treatment and logic model. These outcomes included the average grade in ENGL 101N, GPA at end of the fall semester, fall to spring retention rate, and the mean number of credits attempted in the spring semester. In addition, the institutional researcher collected demographic data for the treatment and control groups from the system. In keeping with HIRB protocol, the institutional researcher removed all students under 18 years of age from the dataset and removed all personally identifiable information. The institutional researcher then uploaded the data into an Excel spreadsheet and provided a codebook for identifying the different variables in the dataset. To proceed with the data analysis, I uploaded this Excel spreadsheet into SPSS.

Student and faculty focus groups. I collected qualitative data by conducting two student focus groups and two faculty focus groups recruited using a purposeful sampling approach (Lochmiller & Lester, 2017). I organized the student focus groups based on class meeting day. For example, students with Wednesday morning classes attended the Wednesday afternoon focus group and Tuesday ENGL 101N students attended the Tuesday session. For students, I used a

structured interview schedule (see Appendix F) so they could describe their experiences using OER learning materials in English composition class. For faculty focus groups, I organized each meeting based on the instructor's role. One of the focus groups included OER developers and the second group consisted of OER adopters. I used a structured interview schedule (see Appendix G) to investigate how variations in instructor experience might explain any significant differences noted in students' academic success and enrollment status outcomes.

All interviews with faculty and students were one hour in length. I began each interview by introducing myself, going over the focus group guidelines, and asking participants to sign the informed consent form (see Appendix H). I also asked permission from participants to record the interview. During each conversation, I used an app called Otter to record and produce a real-time transcription of the discussion. I then downloaded each transcript to my computer to begin the coding process. Figure 8 provides a timeline illustrating the sequential steps used to administer and collect data on this treatment program.

Data Analysis

In keeping with the quasi-experimental mixed methods design, I incorporated both quantitative and qualitative strands in the data analysis plan. This section discusses the statistical tests and the coding process used to answer the process and outcome research questions associated with this study.

Quantitative analysis. I analyzed quantitative data using descriptive and inferential statistical tests to complete my process and outcome evaluations. Descriptive statistics, such as the calculation of frequencies, percentages, and means, provided me with information about the specific characteristics of my dataset.

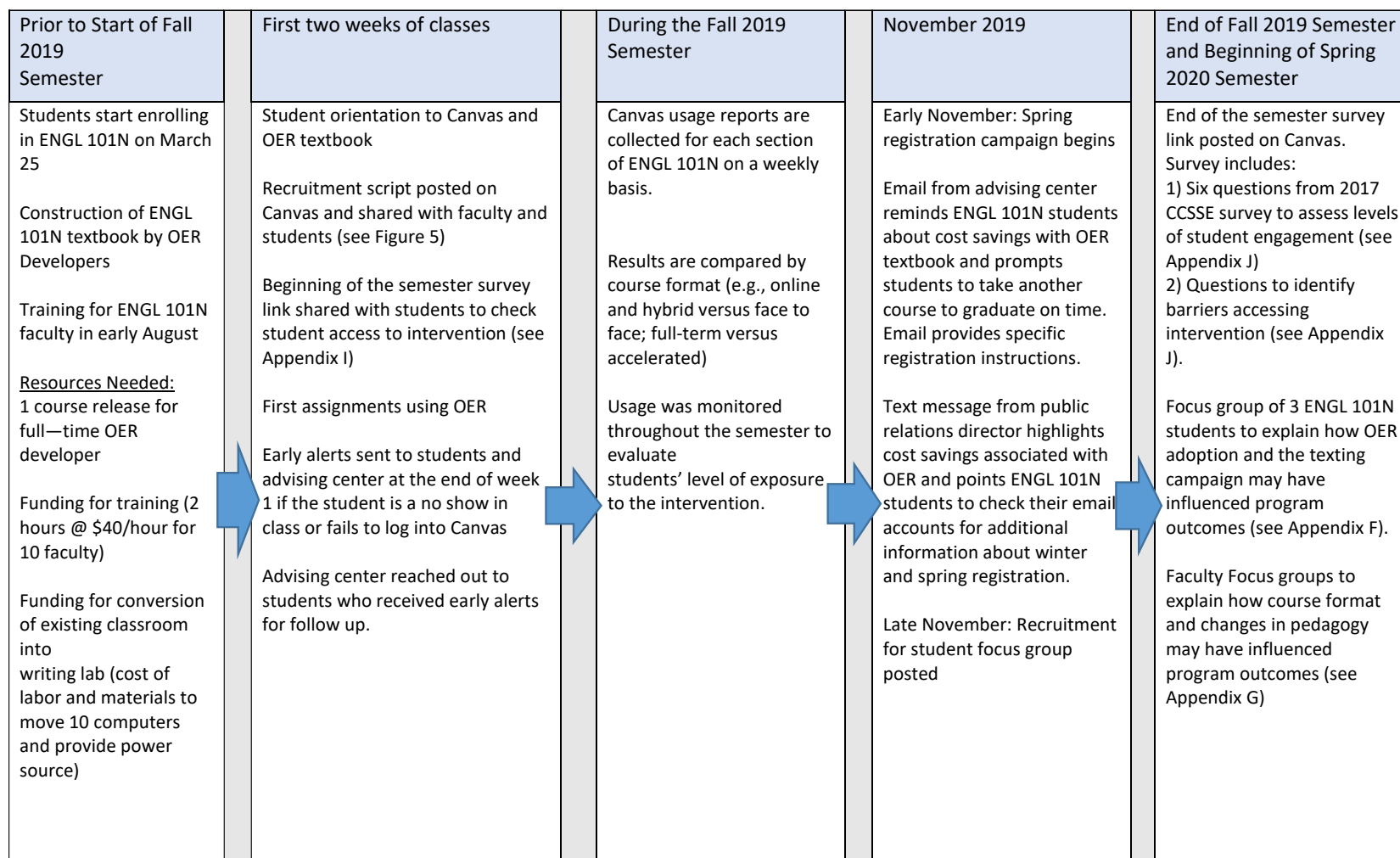


Figure 8. Evaluation timeline for a two-phase intervention to address the problem of low retention and completion rates of students at Nashua Community College. CCSSE = Community College Survey of Student Engagement; OER = open educational resources.

Inferential statistical tests, including independent sample t-tests, ANOVA, and regression, allowed me to evaluate the associations between variables and make possible generalizations about my findings for a larger population (Lochmiller & Lester, 2017).

Project implementation (Research Questions 1 and 4). I used descriptive statistics to evaluate the implementation of phases one and two of the intervention. For phase one (RQ1), I used Canvas reports to show the frequency and percentage of ENGL 101N course sections in fall 2019 that had deployed the metacourse with the embedded OER textbook on Canvas. I used ENGL 101N syllabi from fall 2019 to show the frequency and percentage of instructors who assigned readings from the OER textbook on a regular basis. For phase two (RQ4), I used descriptive statistics on the frequency and percentage of text messages delivered to ENGL 101N students on November 8, 2019.

Barriers (Research Question 2). In addition, I used descriptive statistics to evaluate potential barriers preventing ENGL 101N students from accessing the treatment program (RQ2) as planned. I used the Qualtrics report tool to view the frequency and percentage of students who indicated barriers to computer and/or Internet access based on their responses to questions on survey conducted at the beginning and end of the semester (see Appendices I and J). To analyze the open-ended responses to survey question 13 (see Appendix I), I grouped responses into categories to identify barriers to student access.

Dose (Research Questions 3, 3A, and 3B). I used both descriptive statistics to evaluate students' dose of the intervention (RQ3). For each course section, I used data from Canvas reports uploaded to SPSS to calculate the percentage of students who viewed the OER textbook page; the percentage of total OER textbook page views versus total percentage of course page views; and the mean total OER textbook views per student for the whole course. Next, I used

descriptive statistics to calculate the mean total OER textbook views per student for all course sections. In addition, I calculated the range, standard deviation, and variance to compare the means across different course sections.

In addition, I examined whether there were any associations between students' usage of the OER textbook and course format or instructor experience (RQ3A & RQ3B). To analyze these questions, I first grouped students by course format (i.e., length of term; online/hybrid versus face to face; instructor experience with OER). Second, I conducted an independent samples t-test to identify any significant differences between the mean total OER textbook views per student based on course format. Similarly, I grouped students by instructor experience (i.e., OER developer versus OER adopter). Again, I conducted a two-sample t-test to identify any significant difference between the mean total OER textbook views per student based on instructor experience.

Academic success and enrollment status (Research Question 5). The quantitative component of my outcome evaluation involved comparing the academic success and enrollment status measures for students enrolled in ENGL 101N in fall 2019 (treatment group) coded 1 with the measures for students enrolled in the same course in fall 2018 (control group) coded 0. Using student administrative data uploaded to SPSS, I conducted ANOVA (equivalent to independent sample t-tests) to complete my analysis. As noted in the section on measures, I used three indicators to represent the academic success variable: course transferability (i.e., final ENGL 101N grade), fall to spring retention, and GPA. Typically, community college students must earn a grade of C or better in a course if they want to transfer that course to a four-year college or university. As a result, I coded final grade as a dichotomous variable—either *C or better* or *lower than C*. I coded each student earning a C or better 1 and 0 for earning a grade lower than C. I also

coded fall to spring retention as a dichotomous variable. I coded each student 1 for registered for spring and 0 for not registered for spring. On the other hand, I assessed GPA as a continuous variable with each student earning a GPA at the end of the fall semester ranging from 0.0 to 4.0. I also evaluated enrollment status as an ordinal variable based on the number of credits attempted by each ENGL 101N student during spring semester of freshman year. With these variables in place, I conducted a one-way ANOVA test to look for significant differences in the means between the fall 2019 (treatment) and fall 2018 (control) cohorts.

Course format and instructor experience (Research Questions 5A and 5B). To investigate how course format and instructor experience may have been potential moderating variables influencing program outcomes, I conducted additional quantitative analysis using institutional data for ENGL 101N students enrolled in the fall 2019 (treatment cohort). First, I grouped ENGL 101N students into two categories based on delivery mode. I coded students enrolled in online/hybrid sections of ENGL 101N as 0 and 1 for those enrolled in face to face course section. I looked for significant differences in the academic success and enrollment status of the face-to-face students versus the online/hybrid students by conducting an independent samples t-test. I also wanted to know if students in the full-semester (16 week) sections had different outcomes than students who enrolled in the accelerated (8 week) sections. I repeated the same process as above, only this time, I grouped ENGL 101N students into two categories based on length of term. I coded students 1 when enrolled in a 16-week course section and 0 when enrolled in an eight-week course section. I completed the same quantitative analysis process described above to look for significant differences in the academic success or enrollment status of ENGL 101N students based on length of term. To evaluate how instructor experience may have influenced program outcomes, I divided students enrolled in fall 2019 sections of ENGL

101N into two groups. I coded each student 0 when enrolled in a course section taught by an OER developers and 1 when enrolled in a course section taught by an OER adopter. I followed the same quantitative analysis process described previously to identify significant differences in the academic success or enrollment status of ENGL 101N students based on instructor experience.

Qualitative analysis (Research Question 6). In my outcome evaluation, I also used qualitative analysis to explain my quantitative findings. I employed both a deductive and inductive coding process to evaluate student and faculty focus group data (Miles et al., 2014). Although I followed the same coding process to analyze both student and faculty focus group transcripts, I kept separate codebooks for student, OER developer, and OER adopter focus group data.

To prepare for my first round of coding, I identified several key benefits of OER adoption based on the literature and used these benefits to establish a priori descriptive codes. These codes included cost (Hilton, 2016); access (Grimaldi et al., 2019); quality (Bliss et al., 2013; Fischer et al., 2015); and student satisfaction (Pawlyshyn et al., 2013). Next, I developed a definition for each one of these codes. During my first cycle of coding, I identified specific quotes associated with each code and I made notations to document my thinking as I worked through this process. In my second cycle of coding, I used an inductive process to identify additional descriptive codes that emerged from a review of the focus group transcripts. As in the first deductive cycle of coding, I defined each of the codes, selected representative quotes, and added researcher's notes. In my final cycle of coding, I grouped descriptive codes by themes according to the quantitative research questions. This made it possible to integrate findings so qualitative data could be used to explain the quantitative results of this research study (Creswell & Plano-Clark, 2018).

Summary Matrices

Tables 16 and 17 illustrate the alignment between various components of the program evaluation including research questions, indicators and variables, data collection tools, and the data analysis plan. In the chapter that follows, I will describe the findings of this research study and draw conclusions about the effectiveness of this two-phase intervention designed to improve the academic outcomes of first-year students enrolled at Nashua Community College.

Table 16

Process Evaluation Plan: Data Collection and Analysis Matrix

	Question	Indicator	Source	Collection tool	Frequency	Analysis
	RQ1: To what extent did ENGL 101N instructors implement the project as planned?	Project implementation: ENGL 101N instructors deployed metacourse ^a with embedded OER textbook	Canvas ENGL 101N instructors	Canvas report Course Syllabi	End of semester	Descriptive statistics
	RQ2: To what extent were OER learning materials accessible to students as planned?	Barriers: ENGL 101N students who identified problems with computer and/or Internet access	ENGL 101N students	Student surveys	Beginning and end of semester	Descriptive statistics
	RQ3: To what extent did ENGL 101N students use OER learning materials on a regular basis?	Dose: page views of OER textbook by ENGL 101N students	Canvas	Canvas report	End of semester	Descriptive statistics
101	RQ3A: How was course format associated with students' usage of OER learning materials?	Dose: page views of OER textbook by course format	Canvas	Canvas report	End of semester	Descriptive and inferential statistics (<i>t</i> test)
	RQ3B: How was instructor experience associated with students' usage of OER learning materials?	Dose: page views of OER textbook by instructor experience	Canvas	Canvas report	End of semester	Descriptive and inferential statistics (<i>t</i> test)
	RQ4: To what extent was the text messaging campaign delivered as planned?	Project implementation: percentage of text messages delivered to ENGL 101N students	Club Texting	Club Texting report	Mid-November	Descriptive statistics

Note. OER = open educational resources.

^aThe metacourse is where English composition students access the OER textbook for the course. In place of a traditional textbook, the OER textbook provides students with a series of links to online course readings and resources such as writing exemplars. The OER textbook is embedded in the metacourse and is accessible to all students via Canvas—the college's online learning management system.

Table 17

Outcome Evaluation Plan: Data Collection and Data Analysis Matrix

	Question	Sources	Collection tool	Frequency	Analysis
	RQ5: To what extent was the intervention associated with improved academic success and enrollment status of students enrolled ENGL 101N at NCC in fall 2019, compared to outcomes for students in same course in fall 2018? ^a	Registrar's office Institutional researcher	Banner Reports	Beginning of spring 2020 semester	Descriptive statistics and inferential statistics (analysis of variance)
	RQ5A: How was variation in section format (e.g., online, face to face, length of term) associated with variations in the academic success and enrollment status of ENGL 101N students in fall 2019? ^b	Registrar's office Institutional researcher	Banner Reports	Beginning of spring 2020 semester	Descriptive statistics and inferential statistics (<i>t</i> test)
107	RQ5B: How was variation in instructor experience associated with variations in the academic success and enrollment status of ENGL 101N students in fall 2019? ^b	Registrar's office Institutional researcher	Banner Reports	Beginning of spring 2020	Descriptive statistics and inferential statistics (<i>t</i> test)
	RQ6: To what extent does faculty and student focus group data reporting on the use of OER learning materials help explain the outcomes of a treatment program design to increase the retention rates first-year students at NCC? ^a	ENGL 101N students ENGL 101N faculty	Focus groups	End of fall semester Beginning of spring semester	Transcription of focus group interviews, descriptive coding, and grouping of codes by themes related to student engagement, OER adoption, and cost savings

Note. All questions were evaluated using the constructs of academic success and enrollment status. The construct of academic success of ENGL 101N students was measured by several indicators, including course transferability (earning a grade of C or better in ENGL 101N), fall to spring retention rate, and grade point average. The construct of enrollment status of ENGL 101N students was measured by the number of credits students attempted each semester. Students attempting 12 or more credits per semester were considered full-time students. Students attempting fewer than 12 credits per semester were considered part time. NCC = Nashua Community College; OER = open educational resources.

^aOutcome measure/dependent variable. ^bModerating variable.

Chapter 5

Findings and Discussion

This chapter describes the findings of a study to evaluate a two-phase intervention designed to encourage community college students to earn more credits by lowering the cost of attendance, increasing student engagement levels, and improving communications between college personnel and students. As noted previously, the intervention took place between August and December 2019 and it targeted all first-time freshmen enrolled in English composition (ENGL 101N) at Nashua Community College (NCC). The first phase of the intervention replaced the commercial textbook used in all sections of ENGL 101N with a no cost, open educational resources (OER) textbook. The second phase of the intervention involved a text messaging campaign designed to inform ENGL 101N students about OER cost savings and the benefits of full-time enrollment. This chapter presents research findings according to the following research questions. RQ1–RQ4 are process evaluation questions, and RQ5–RQ6 are outcome evaluation questions.

RQ1. To what extent did ENGL 101N instructors implement the project as planned?

RQ2. To what extent were online OER learning materials accessible to students as planned?

RQ3. To what extent did ENGL 101N students use OER learning materials on a regular basis?

RQ3A. How was course format (e.g., length of term; online/hybrid, face to face) associated with variation in students' usage of OER learning materials?

RQ3B. How was instructor experience associated with variation in students' usage of OER learning materials?

RQ4. To what extent was the text messaging campaign delivered as planned?

RQ5. To what extent was the intervention associated with improved academic success and subsequent enrollment status of students enrolled in ENGL 101N at NCC in fall 2019, compared to outcomes for students in the same course in fall 2018?

RQ5A. How was variation in section format (e.g., length of term; online/hybrid, face to face) associated with variations in the academic success and spring enrollment status of ENGL 101N students in fall 2019?

RQ5B. How was variation in instructor experience associated with variations in the academic success and subsequent enrollment status of ENGL 101N students in fall 2019?

RQ6. To what extent did student and faculty focus group data reporting on the use of OER learning materials help explain the outcomes of a treatment program designed to increase the retention rates of first year students at NCC?

Following the presentation of findings, a discussion section will describe the significance of the findings within the context of the research literature. This chapter will continue with sections explaining the limitations associated with this study, directions for future research, and implications for practice. The conclusion will present overall recommendations for community college administrators, faculty, and staff who are seeking to raise the retention and completion rates of their students.

Process Evaluation Results

The process evaluation assessed potential threats to the validity of this research study including project implementation, barriers, and dose (Baranowski & Stables, 2000; Dusenbury et al., 2003; Stufflebeam, 2003; Zhang et al., 2011). Project implementation and barriers appeared

to be the most significant factors during the planning stages of this intervention; however, findings indicated that dose posed the greatest threat to the fidelity of implementation.

Research Question 1

RQ1: To what extent did ENGL 101N instructors implement the project as planned?

Table 18 summarizes the implementation measures for each of the 18 different sections of ENGL 101N offered during the fall 2019 semester at NCC (with 12 different instructors). The instructors in all course sections (100%) downloaded the metacourse with the embedded OER textbook to his/her individual Canvas course and made the Canvas course available to students as planned. Further, instructors in 17 out of 18 course sections (94.4%) assigned readings from the OER textbook on a regular basis according to a review of ENGL 101N syllabi. These findings indicate that ENGL 101N instructors implemented the intervention with a high level of fidelity.

Focus group interviews with OER adopters and OER developers illuminated several factors that explained the high level of project implementation among ENGL 101N faculty. First, the English program coordinator built an ENGL 101N metacourse on the learning platform (Canvas) along with a model syllabus to support greater consistency across all sections of the ENGL 101N course. As noted previously, the metacourse provided faculty with a series of shared resources and it was organized into weekly modules according to the sequence of five required writing assignments (i.e., narrative, compare/contrast, cause/effect, persuasive, and process essays). The metacourse had been in use for two years prior to the OER intervention, so instructors were already familiar with the use of this tool. It is important to note how the presence of the metacourse likely facilitated project implementation because the metacourse made it easy for instructors to make the OER textbook available for their students.

Table 18

*Implementation of Open Educational Resources (OER) Textbook Intervention in ENGL 101N**Sections in Fall 2019*

Section	Format	Week															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1st 8 weeks			X	X	X											
2	16 weeks	X	X	X	X	X	X	X		X	X						
3	16 weeks	X		X		X	X	X		X	X						
4	2nd 8 weeks									X	X	X	X	X			
A	16 weeks	X	X	X	X	X	X	X			X	X					
B	16 weeks	X	X	X	X	X	X	X	X		X	X					
C	16 weeks	X	X	X	X	X	X	X	X		X	X					
D ^a	16 weeks										X	X					
E	16 weeks	X	X	X	X	X	X	X	X		X	X					
F	16 weeks	X	X	X	X	X	X	X	X		X	X					
G	16 weeks	X	X	X	X	X	X	X			X	X					
H	16 weeks	X	X	X	X	X	X	X			X	X					
HYB ^b	1st 8 weeks																
I	16 weeks	X	X	X	X	X	X	X			X	X					
J	16 weeks	X	X	X	X	X	X	X			X	X					
K	16 weeks	X	X	X	X	X	X	X			X	X					
L	16 weeks	X	X	X	X	X	X	X			X	X					
ZZ	16 weeks		X	X	X	X	X	X	X			X					

Note. An *X* indicates that there was an assigned reading for the given section in the given week. Metacourse was available for every section.

^aThere was a new instructor assigned to ENGL 101N Section D at week 8. There was no syllabus for the first 8 weeks for Section D. ^bNo OER textbook assignments noted in syllabus.

One of the OER adopters provided insight into the value of the metacourse from an instructor's perspective:

Even when we were using a textbook, [the program coordinator] would make us what she called a metacourse which was basically a course that we could import using Blackboard [the college's learning management system] at the time. And that way we could have a lot of material shared, and it would take away a lot of our front-loaded work. And we modify it, so that I think that did help the OER [textbook] come about because [the program coordinator] had already digitized so many things that it was a more natural step to leave the textbook behind.

In addition to the metacourse, the English program coordinator built a model syllabus that likely encouraged faculty to assign readings from the OER textbook on a regular basis. One OER developer described how this syllabus provided instructors with a suggested course calendar—including reading assignments using the OER textbook scheduled for weeks 1-7, 10 and 11. Although individual instructors did have the ability to select alternate assignments that accomplish the same learning objectives, a review of the ENGL 101N syllabi from fall 2019 indicated that ENGL 101N faculty preferred to use the model syllabus. This is evidenced by the fact that 15 out of the 15 ENGL 101N sections (100%) scheduled for the 16-week semester had OER readings assignments in the syllabus calendar that aligned with the model syllabus (see Table 18).

Faculty support appears to be another factor contributing to the high fidelity of project implementation. Focus group findings suggest there was little faculty resistance to changing textbooks. Both OER adopters were enthusiastic about the idea of a free, online textbook. On the one hand, they were sensitive to high commercial textbook costs. When asked about their reaction when they heard about the OER textbook, one individual responded, “I was really happy . . . I remember being a student and just having to buy books. I know this book [the commercial

textbook] . . . in the grand scheme compared to books, it's not a big expense—but it's still an expense.” In addition, they acknowledged the book's electronic format might be a more accessible medium for student readers since “students are much more used to reading thing electronically.” It is important to note that one faculty member did express some qualms about the new format:

I kind of liked teaching students how to read on paper, because I don't feel like that's useless yet. Maybe it will become so, but it's a different part of your brain. And I mourn the loss of that a little bit.

In the end, however, both instructors strongly endorsed the OER project. In one person's words, “I was really excited about it. I never heard that that [OER] was a thing that was possible. And I just thought it was really cool idea and then curious—like how is this going to work?”

Qualitative evidence also suggests that the English program coordinator played an important role in securing faculty buy-in for OER adoption by providing opportunities for professional development and ongoing support. For example, one of the focus group participants explained that he had been unable to attend the two-hour training session where the English program coordinator introduced the new OER textbook to the ENGL 101N instructors. He was appreciative of how the program coordinator met with him one-on-one to go over the updated metacourse. He explained:

She just made it more of a Q & A . . . she was teaching us how to navigate without the textbook . . . she troubleshoots, so much. And then she goes over like what the little pitfalls still can be when you translate these things and what she's learned. You know she really described something about giving us tools and strategies to deploy these things.

Research Question 2

RQ2: To what extent were online OER learning materials accessible to students as planned?

Data from student surveys administered at the beginning and end of the fall 2019 semester (see Appendices I and J) provided evidence regarding the extent to which students experienced barriers in accessing OER learning materials. Findings indicated that very few ENGL 101N students reported a lack of computer and/or Internet access affecting their ability to use the OER textbook. For example, 1 out of 12 students (8.3%) reported a computer/Internet access issue at the beginning of the semester; and 7 out of 90 students (7.8%) reported issues at the end of the semester.

Although participation in the beginning of the semester survey was very low (N=12 students), 11 out of 12 students (91.7%) had a laptop they could bring to class and/or a computer and Internet to access outside of class. The survey found that 58.3% of ENGL 101N students (n=7) had a laptop that they could bring to class every day; 16.% (n=2) stated they had laptops, but they would not be able to bring them to class often; and 25% (n=3) responded they did not have a laptop they could bring to class. When asked if they had a computer they could use at home to complete assignments, 83.3% of ENGL 101N students (n=10) responded they had a computer they could use any time or most of the time. Of the remaining students, one student indicated he/she had a computer at home, but the computer was not always available; and one student had no computer to use at home. For the ten ENGL 101N students who stated they had a computer to use at home any time or most of the time, all ten (100%) responded they had reliable Internet they could use all of the time or most of the time for completing assignments. Of the two remaining students who stated they had limited or no computer access at home, the survey asked

if they would be able to get computer and Internet access for at least eight hours per week in another location such as the NCC library or the public library. One student responded yes and one student responded no. When asked to list any other issues that might affect their ability to complete ENGL 101N assignments posted on Canvas, two students noted family and/or work responsibilities. One student explained he/she had an iMac computer that needed to stay at home. Another student wrote, “I live in a treatment center and we have limited access to computers, and I have groups I need to attend at the rehab center to be able to stay in the program.”

The end of semester survey, completed primarily during the final session of the course, evaluated the barriers that ENGL 101N students experienced while accessing online course materials in fall 2019. As compared to the beginning of the semester survey, the students’ response rate at the end of the semester was much better (N=90, or 30.8% of students enrolled).³ When asked how many issues they had encountered using online course materials, 54.4% of ENGL 101N students (n=49) reported no issues. Of the remaining 38 students who experienced issues, 30% (n=27) reported only minor issues; 8.9% (n=8) experienced some issues; and 6.7% (n=6) reported they had encountered many issues. Table 19 indicates some of the specific barriers these students faced while trying to access the online learning materials posted on Canvas. Similar to results from the beginning of the semester survey, very few students (n=7) reported a lack of computer and/or Internet access as a barrier to using the OER learning materials. In terms of the impact on their course performance, 13.1% of these students (n=5)

³ N is significantly larger than the numbers of students in the treatment group (N=211) because the survey link was sent to all students enrolled in ENGL 101N in fall 2019 (N=292). The course included individuals other than first-time students at NCC. Per IRB requirements, those under 18 years of age were excluded from survey participation by the first survey question.

reported these barriers affected their course performances a *great deal*, and 26.3% (n=10) stated their performance was *somewhat* affected. On the other hand, 60.5% (n=23) indicated these barriers had *minimal* or *no impact* on their course performance.

Table 19

Barriers to ENGL 101N Students Accessing Online Learning Materials in Fall 2019 at Nashua Community College

Barrier	Count (%)
I had difficulty using Canvas	12 (23.5%)
I work too many hours to use online materials outside of class	11 (21.6%)
Other (please explain) ^a	8 (15.7%)
My computer broke down in the middle of the semester	7 (13.7%)
I needed more technical support	6 (11.8%)
I don't have a computer at home	4 (7.8%)
I don't have Internet access at home	3 (5.9%)

Note. The survey allowed students to choose more than one barrier.

^aOther factors listed by students included the following: “Understanding the vocabulary on some topics was difficult to me, and my eyes got tired,” “The textbook was hard to understand,” “Awful program,” “Homeless first half of semester,” “Learning to use, navigate, and upload assignments. It took a couple of weeks in the beginning, but I’m able to use it now; I could only access Microsoft word through the Internet. Was not provided the information on how to download Microsoft word on to the computer or an ‘access code,’” “I had issues getting into the library databases,” and “job.”

For the most part, focus group interviews validated student survey results in terms of computer and Internet access. One of the OER developers found it “really interesting that most of my students have laptops.” From the students’ perspective, none of the focus group participants reported any issues accessing the OER textbook. When prompted further, however, two of the students did mention the importance of having reliable Wi-Fi, especially at the college, because of data restrictions on their phone plans. When asked if they were able to

download sections of the textbook for use offline, one student explained how the design of the OER textbook [a PDF with clickable links] made this difficult.

Although a lack of computer and Internet access seemed to be less of a barrier than originally anticipated, students' survey responses revealed other factors that made it difficult for students to access the OER textbook. Again, focus group data validated survey responses. OER developers noted that some students struggled to learn Canvas and required additional technical support. As one OER developer explained:

I mean, it was a little frustrating the first week because there were people, and this is the case always, that can't figure out Canvas; I can't get on this; I don't have my last password. Like everybody [faculty] has spent a lot of time, helping; and I think not everyone wants to do that—right? There are instructors who feel like it [orienting students to Canvas], that's not my job.

In addition, OER adopters and students noted some design issues and technical glitches that made it confusing for students to use the OER textbook. One of the OER adopters made the following statement when asked to describe barriers students had encountered:

One of the issues that a lot of students experienced was that the way the pages turned in the OER textbook, were hyperlinks. . . . So, they often became anxious about where do I stop? . . . And I would get emails throughout this term just to double check, you know, conscientious students in particular, would be like, I don't want to not do the homework, but it's unclear where this stops; and then there were a few broken links too.

One of the students described a similar problem, “There was no problem accessing it [the OER textbook], but there were sometimes where I didn't know yet to keep on clicking to continue.”

Research Question 3

RQ3: To what extent did ENGL 101N students use OER learning materials on a regular basis?

Analyses explored the extent to which students received a consistent dose of the intervention across all course sections. As shown by Table 20, three indicators measured OER textbook usage for each ENGL 101N section: the percentage of students viewing the textbook page on Canvas; the percentage of textbook page views compared to the course home page views; and the average total number of textbook page views per student for the whole course. Descriptive statistics found a high percentage of ENGL 101N students who accessed the OER textbook during the fall 2019 semester. For example, 88.9% of ENGL 101N sections had 80% or more of enrolled students who viewed the OER textbook page on Canvas (see Figure 9). One section had significantly lower percentage of students who accessed the textbook page (44.4%). This section was the second-eight-week evening section added to the schedule to accommodate new students who enrolled after the start of the fall semester.⁴

Although the percentage of students viewing the textbook page was high, student usage of the OER textbook was very inconsistent across ENGL 101N course sections (see Table 21 and Figure 10). As shown in Table 21, the total number of textbook page views per student ranged from a low of 1.6 page views in one section to a high of 47.6 page views per student in another section. Further, the total dosage of the intervention for ENGL 101N students appeared to be relatively low. More specifically, the mean number of total textbook views per student for the

⁴ It is interesting to note the same instructor taught both accelerated evening sections, so it is difficult to determine the reason for this discrepancy in student textbook usage.

whole course was 23.2 page views.⁵ Overall, the intervention was available to students; but fluctuations in OER textbook usage by course section and the low level of student exposure to the intervention suggest there may be potential threats to validity in terms of dose.

Table 20

Open Educational Resources Textbook Usage in ENGL 101N Sections in Fall 2019

Section	No. students completing course	% of total students viewing textbook page	Page views as % of total course home page views	Average number of page views for the whole course for each student completing course
1	7	100.0	20.3	13.3
2	14	100.0	18.8	34.7
3	13	92.3	21.4	21.0
4	9	44.4	1.7	1.6
A	24	100.0	9.9	18.3
B	20	95.0	17.2	23.7
C	21	95.2	18.5	29.8
D	20	90.0	7.3	9.1
E	11	100.0	40.0	29.7
F	11	100.0	51.3	47.6
G	18	100.0	35.4	34.9
H	21	100.0	20.3	30.1
HYB	6	83.3	7.0	17.2
I	15	100.0	16.6	20.7
J	19	100.0	31.0	35.9
K	11	81.8	7.0	17.5
L	23	100.0	15.2	26.0
ZZ	24	75.0	3.3	7.0

⁵ It is important to note that this study could have underestimated the number of textbook page views. For example, a student could have downloaded the English textbook PDF and then accessed the links outside of Canvas. This usage would not have registered in the textbook page view count.

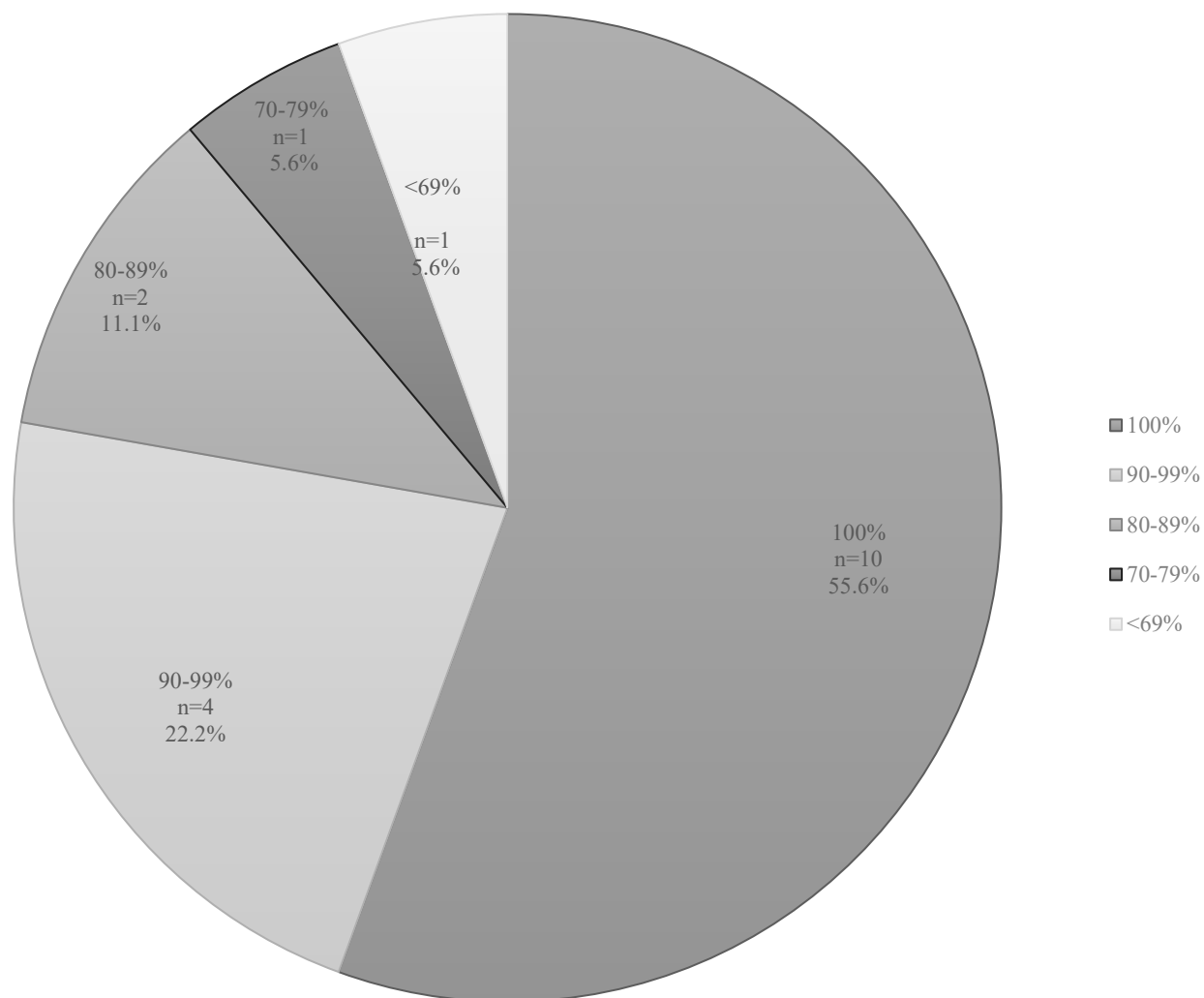


Figure 9. Chart illustrating the percentage of ENGL 101N students who accessed the OER textbook during the fall 2019 semester by course section. $N = 18$.

Table 21

Textbook Page Views Across Sections

Statistic	Value
N	18
M	23.2
SD	11.6
Minimum	1.6
Maximum	47.6

Note. Section means based on total of students completing ENGL 101N in fall 2019.

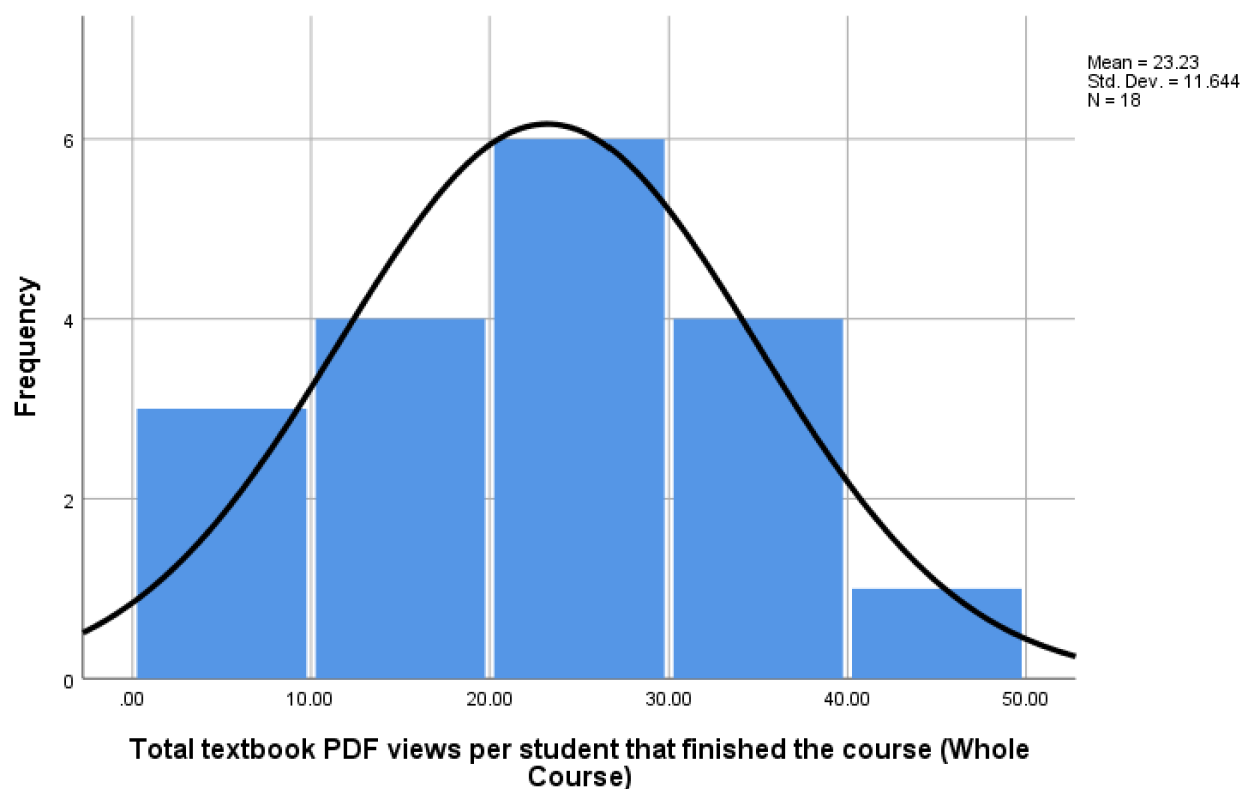


Figure 10. Histogram illustrating the variance in ENGL 101N students' open educational resources textbook usage by course section.

Student focus group participants suggest that textbook usage may have varied so widely due to the nature of the English composition course. As one student explained, "I mostly use textbook as a reference guide whenever I forget how the format was for a paper or something." Two students suggested that they would use the textbook differently in a course like history, mathematics, or science. As one student put it, "it's going to be different between the liberal arts . . . and the hard sciences. . . . You're going to need textbooks for the hard sciences." According to another student:

It [an English textbook] doesn't have to be so in depth. Because I know for all my other textbook that's really in depth with like, lots of information history. But for English class,

this textbook would do because it's only teaching our format and write papers—so you wouldn't need a thick textbook.

Further, variations in student textbook usage may also be related to the extent to which individual instructors check student understanding of the assigned readings. The OER developers, for example, explained they both gave quizzes to encourage students to complete the textbook readings. As one of the developers explained, “I learned early on here—if you think they [students] are going to do the reading just so they can have the discussion that's not usually the case. They need to have a quiz.” However, not every ENGL 101N instructor takes this approach—“some people do journals;” and some people may do little in the way of formative assessment of textbook readings. Similarly, students reported their instructors used the textbook in different ways. According to one student:

Well from my class, besides those few assignments that are in the textbook, the textbook isn't really a requirement because we're mostly writing papers. So you know, if I'm not sure about how something [a paper] should be set up, then I can reference the textbook. Otherwise, it's not really used all too much.

Another student explained:

She [the student's English professor] actually used the free book inside of class. We . . . wrote essays on it; we did exercises; she referenced it a lot. And we had to go in there and use it. So (for) whoever put it together, it wasn't wasted time at all. I think everybody (other students) appreciated it—I appreciated it.

Research Question 3A. RQ3A: How was course format (e.g., length of term; online/hybrid, face to face) associated with variation in students' usage of OER learning materials? Additional analyses compared student usage of OER learning materials across

different course formats. As shown in Tables 22 and 23, the difference in the mean number of textbook page views per student based on course delivery mode (i.e., online/hybrid versus face to face) was not statistically significant (possibly due to the small sample size). However, there was a significant difference in students' textbook usage (sig. = .036) based on length of term (see Tables 24 and 25). Findings indicate that each student enrolled in an 8-week section of ENGL 101N viewed the textbook, on average, 10.7 times during the course as compared to students enrolled in a 16-week section who viewed the textbook an average of 25.7 times. This evidence suggests that length of term may have been a factor contributing to the fluctuations noted in students' OER textbook usage across course sections in fall 2019. However, additional research will be necessary due to limitations in the sample size. For example, only three out of the 18 ENGL 101N sections (16.7%) were taught in an accelerated format. Also, these sections tended to be much lower enrolled than the 16-week sections with an average enrollment of 7.3 students in accelerated course sections versus 17.7 students for the 16-week course sections. Further, one of the accelerated sections had a substantially lower percentage of students who accessed the textbook (44.4%) as compared to the other course sections. Given the small sample size, it is likely the data from this one section skewed the results.

Research Question 3B. RQ3B: How was instructor experience associated with variation in students' usage of OER learning materials? Further analyses compared student usage of OER learning materials across ENGL 101N course sections based on instructor experience. For the purpose of this study, instructor experience was defined as the level of each instructor's familiarity with the no cost textbook (i.e., OER developer or OER adopter).

Table 22

ENGL 101N Students' Usage of Open Educational Resources Textbook by Course Format—

Length of Term

Course format	<i>n</i>	Textbook page views per student	
		<i>M</i>	<i>SD</i>
8-week term	3	10.67	8.13
16-week term	15	25.74	10.71

Table 23

Two-Tailed Test for Equality of Means for Textbook Page Views per Student—Length of Term

Variable	<i>t</i>	<i>df</i>	<i>p</i>
Textbook page views per student	−2.287	16	.036*

**p* < .05.

Table 24

ENGL 101N Students' Usage of Open Educational Resources Textbook by Course Format—

Face-to-Face Versus Online/Hybrid

Course format	<i>n</i>	Textbook page views per student	
		<i>M</i>	<i>SD</i>
Face-to-face	16	24.63	11.47
Online/hybrid	2	12.06	7.22

Table 25

Two-Tailed Test for Equality of Means for Textbook Page Views per Student—Face-to-Face

Versus Online/Hybrid

Variable	<i>t</i>	<i>df</i>	<i>p</i>
Textbook page views per student	1.489	16	.156

As shown in Tables 26 and 27, students in sections taught by OER developers ($\bar{x} = 31.97$) were viewing the textbook page more than students in adopter taught sections ($\bar{x} = 21.48$); however, the sample size was too small to show a significant difference.

Table 26

ENGL 101N Students' Usage of Open Educational Resources (OER) Textbook by Instructor Experience

Instructor experience	<i>n</i>	Textbook page views per student	
		<i>M</i>	<i>SD</i>
Section taught by OER adopter	15	21.48	11.97
Section taught by OER developer	3	31.97	3.45

Table 27

Two-Tailed Test for Equality of Means for Textbook Page Views per Student—Instructor Experience

Variable	<i>t</i>	<i>df</i>	<i>p</i>
Textbook page views per student	-1.471	16	.161

As noted above, a focus group interview with OER developers revealed they routinely gave quizzes to check student understanding of the required textbook readings. This could be a factor contributing to the differences in mean textbook page views per student based on instructor experience (see Table 26).

Research Question 4

RQ4: To what extent was the text messaging campaign delivered as planned?

Figure 11 shows the results of a text messaging campaign that targeted all students enrolled in ENGL 101N in fall 2019 (N=292). This was a larger group than the treatment group (N=211) because the latter was limited to first time freshmen over the age of 18 and matriculated into an NCC program. The report indicated the delivery rate of the texting campaign was very high. As shown in Figure 11, the text message was delivered to 90.8% (265 of 292) of ENGL 101N students. Although the service delivered the text message as planned, it is unclear if this phase of the intervention prompted students to take any action. Students' responses to the end of the semester survey offered some insight into the effectiveness of the text messaging campaign in prompting ENGL 101N students to register for spring classes. Out of 80 students who answered the survey question asking if they received a text or email message in early November about spring course registration, 35% (n=28) recalled receiving the text message.

Although student focus group data validated that the text messaging campaign was delivered as planned (all three focus group participants remembered receiving a text and/or email message about spring registration), their responses provided little clarification as to how well the texting campaign nudged ENGL 101N students to take action. Two out of the three focus group participants had already registered for spring courses by the time they received the text. The third student reported he had not yet registered for his spring classes, but he was planning to do so. He said the text served as a "kickstart" for his memory.

Outcome Evaluation Results

Because the outcome evaluation used a quasi-experimental mixed methods design (Creswell & Plano-Clark, 2018), I needed to assess the similarities between the treatment group (fall 2019) and control group (fall 2018) before proceeding with further analysis. This testing

was necessary because significant differences between the groups could produce statistical conclusion errors that could affect the validity of the study (Shadish et al., 2002).

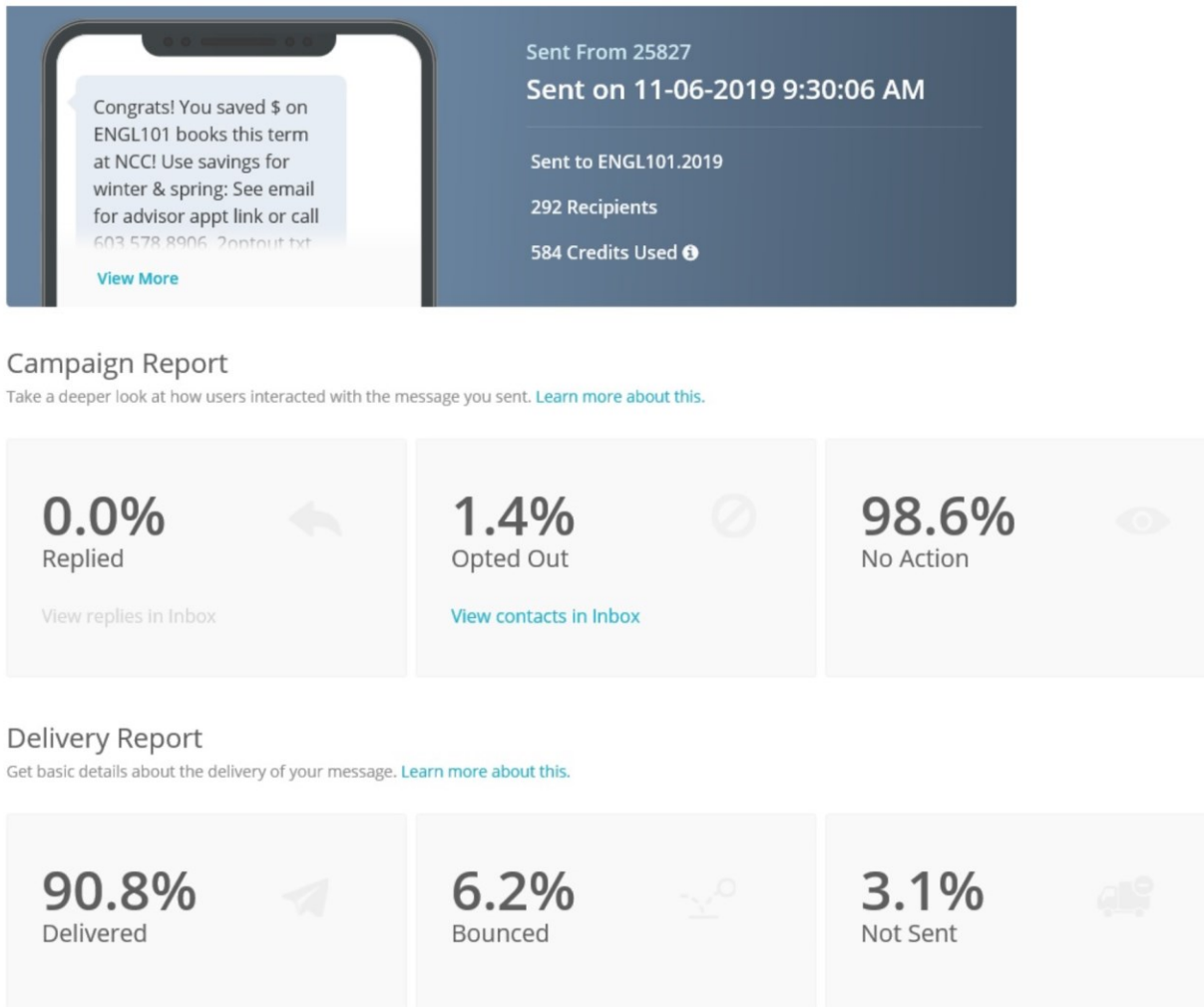


Figure 11. Text messaging platform report showing the delivery rate of a text messaging campaign targeting Nashua Community College students enrolled in ENGL 101N in fall 2019.

Comparison of Treatment and Control Groups

Table 15 summarized the demographic characteristics of the fall 2018 and fall 2019 cohorts of students enrolled in the English composition course at NCC. I used an ANOVA test to compare the demographic similarities of the treatment and control groups and establish baseline equivalencies. As shown in Table 28, I found no statistically significant differences between the

treatment and control groups based on students' gender, race/ethnicity, age, college readiness, or socio-economic status ($p < .05$). There was, however, a significant difference between the treatment and control groups in fall enrollment intensity ($p = .005$) with the fall 2019 cohort having a higher percentage of full-time students as compared to the fall 2018 cohort. Although it was appropriate to proceed with a quasi-experimental research study to identify possible associations between the treatment program and outcomes noted in theory of treatment and logic model (Figure 3 and Appendix D), it was necessary to use regression analysis to control for the difference in fall credit hours noted between the treatment and control groups.

Research Question 5

RQ5: To what extent was the intervention associated with improved academic success and subsequent enrollment status of students enrolled in ENGL 101N at NCC in fall 2019, compared to outcomes for students in the same course in fall 2018?

Academic success. As shown in Table 29, logistic and linear regression analyses found no significant difference in the academic success outcomes of students in the treatment group as compared to the outcomes of students in the control group. Academic success outcomes included ENGL 101N grade (C or better), fall to spring retention, and fall GPA. As a result, there was no evidence to establish any association between the treatment program and the academic success outcomes of ENGL 101N students in fall 2019.

Subsequent enrollment status. When controlling for significant differences between the treatment and control groups in fall enrollment credits, linear regression analysis found that treatment groups students enrolled for significantly more spring semester credits than did comparison group students the year before.

Table 28

Analysis of Variance for Baseline Equivalencies of Treatment (Fall 2019) and Control (Fall 2018) Groups

Variable and source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Fall credit hours					
Between groups	96.317	1	96.317	7.833	.005*
Within groups	5299.600	431	12.296		
Total	5395.917	432			
Age					
Between groups	3.671	1	3.671	0.225	.635
Within groups	7026.652	431	16.303		
Total	7030.323	432			
College readiness					
Between groups	0.285	1	0.285	1.840	.176
Within groups	66.805	431	0.155		
Total	67.090	432			
Gender					
Between groups	0.087	1	0.087	0.353	.553
Within groups	106.661	431	0.247		
Total	106.748	432			
Race/ethnicity					
Between groups	0.003	1	0.003	0.018	.895
Within groups	84.848	430	0.197		
Total	84.852	431			
Socioeconomic status					
Between groups	0.275	1	0.275	1.175	.279
Within groups	100.861	431	0.234		
Total	101.136	432			

* $p < .05$.

Table 29

Estimate of Intervention Effects on ENGL 101N Students' Grades, Fall to Spring Retention, and Fall Grade Point Average

Variable	Intervention		Constant		<i>p</i>
	Value	<i>SE</i>	Value	<i>SE</i>	
C or better in English	1.028	0.219	2.017	0.411	.900
Enrollment in spring semester	1.459	0.242	0.769	0.428	.119
Fall grade point average	0.164	0.112	1.832	0.214	.145
Spring credits	0.910	0.352	2.693	0.711	.010*

Note. $N = 433$. Because of unmeasured differences between the treatment and comparison groups in the two different years, this analysis cannot lead to strong causal conclusions about the impact of the intervention. Estimates are expressed as odds ratios from logistic regression analyses for the dichotomous variables (C or better and spring enrollment). They are expressed as unstandardized regression coefficients for fall grade point average and spring credits. Models control for number of credits taken in the fall semester. Although not shown, additional regression analyses were run to control for age, college readiness, gender, race/ethnicity, and socioeconomic status differences between treatment and control groups. No significant differences in program outcomes were noted.

* $p < .05$.

Although this cannot be viewed as causal evidence of an intervention effect, the text-messaging intervention may possibly have contributed to this significantly higher spring credit enrollment. This could be due to improved communication of institutional expectations regarding enrollment intensity. It is important to consider that ENGL 101N students may not have thought about using textbook savings to take more credits during the spring semester without a text message nudge. As noted in Chapter 2, some NCC students do not have a clear definition of full-time enrollment status or the number of credits they need to take each semester to graduate in a two-year timeframe. Results of the beginning of the semester survey administered to ENGL 101N students in fall 2019 supported the needs assessment findings. Survey results indicated that 25% of ENGL

101N students (n=3 out of 12) were unsure about the number of credits they were taking during the fall 2019 semester.

Research Question 5A. RQ5A: How was variation in section format (e.g., length of term; online/hybrid, face to face) associated with variations in the academic success and spring enrollment status of ENGL 101N students in fall 2019? Independent sample t-tests found no association between variation in ENGL 101N section format and students' academic success outcomes (i.e., final grade in ENGL 101N, fall GPA, and fall to spring retention) or spring enrollment status. Tables 30 and 31 summarize the non-significant findings for each of these tests. Given these results, section format does not appear to be a moderating variable associated with program outcomes.

Table 30

Two-Tailed Tests for Equality of Means by Course Format—Length of Term

Variable	16 weeks			8 weeks			<i>t</i>	<i>df</i>	<i>p</i>	<i>Wp</i> ^a
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>				
Final grade in ENGL 101N ^b	202	0.73	0.446	9	0.89	0.333	-1.396	9.33	.195	.005 ^c
Fall grade point average	202	2.33	1.214	9	2.53	0.699	-0.771	10.28	.458	.035 ^c
Fall 2019 to spring 2020 retention ^d	202	0.82	0.384	9	0.89	0.333	-0.516	209.00	.606	.259 ^c
Number of credits registered for in spring 2020 ^f	166	12.86	3.974	8	10.25	4.097	1.813	172.00	.072	.710 ^c

^aSignificance of Levene's test for equality of variances. ^bC or better coded as 1, and less than C coded as 0. ^cEqual variances not assumed. ^dRetained coded as 1, and not retained coded as 0. ^eEqual variances assumed. ^f*N* = 174 due to attrition between fall 2019 and spring 2020.

Table 31

Two-Tailed Tests for Equality of Means by Course Format—Face-to-Face Versus Online/Hybrid

Variable	Face-to-face			Online/hybrid			<i>t</i>	<i>df</i>	<i>p</i>	<i>Wp</i> ^a
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>				
Final grade in ENGL 101N ^b	182	0.72	0.450	29	0.82	0.384	-1.368	41.27	.179	.005 ^c
Fall grade point average	182	2.29	1.208	29	2.68	1.082	-1.628	209.00	.105	.210 ^d
Fall 2019 to spring 2020 retention ^e	182	0.82	0.382	29	0.83	0.384	-0.045	209.00	.964	.929 ^d
Number of credits registered for in spring 2020 ^f	150	12.96	3.963	24	11.38	4.084	1.812	172.00	.072	.677 ^d

^aSignificance of Levene's test for equality of variances. ^bC or better coded as 1, and less than C coded as 0. ^cEqual variances not assumed. ^dEqual variances assumed. ^eRetained coded as 1, and not retained coded as 0. ^f*N* = 174 due to attrition between fall 2019 and spring 2020.

Research Question 5B. RQ5B: How was variation in instructor experience associated with variations in the academic success and subsequent enrollment status of ENGL 101N students in fall 2019? Independent sample t-tests also found no association between variation in ENGL 101N instructor experience and students' academic success outcomes (i.e., final grade in ENGL 101N, fall GPA, and fall to spring retention) or spring enrollment status. Table 32 summarizes the non-significant findings for each of these tests. Given these results, instructor experience does not appear to be a moderating variable associated with program outcomes.

Although there was no quantitative evidence to conclude the treatment program had any association with the academic success outcomes of ENGL 101N students in fall 2019, focus group interviews indicated that students and professors displayed a high level of satisfaction with the OER materials. Students, OER developers, and OER adopters universally appreciated the cost savings associated with the free online textbook. One student summed it up this way:

It [the free textbook] lifted a lot [of pressure]; I was looking through how much textbooks costs and I spent nearly \$200 on [renting] three textbooks . . . to buy it would be over like \$600. So when I saw that the English textbooks are free, I didn't think that was a thing at first.

Table 32

Two-Tailed Tests for Equality of Means by Instructor Experience

Variable	OER developer			OER adopter			<i>t</i>	<i>df</i>	<i>p</i>	<i>Wp</i> ^a
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>				
Final grade in ENGL 101N ^b	51	0.71	0.460	160	0.74	0.438	-0.531	209	.596	.310
Fall grade point average	51	2.31	1.161	160	2.35	1.210	-0.236	209	.814	.745
Fall 2019 to spring 2020 retention ^c	51	0.84	0.367	160	0.82	0.386	0.397	209	.692	.419
Number of credits registered for in spring 2020 ^d	43	13.07	4.273	131	12.63	3.925	0.619	172	.537	.672

Note. OER = open educational resources.

^aSignificance of Levene's test for equality of variances. Equal variances assumed for all variables. ^bC or better coded as 1, and less than C coded as 0. ^cRetained coded as 1, and not retained coded as 0. ^d*N* = 174 due to attrition between fall 2019 and spring 2020.

In addition, all students commented on the ease of access and the convenience of an online textbook. According to one student, "I like studying in like the car, but I don't want to lug around the textbook. So having it be online, I can just pull from my phone and easily like, catch up on studies." Another student mentioned:

You don't have to haul around the big textbook everywhere. You know it's right on your [laptop]. Everybody brings their laptops to school anyways and it's right there. You know when you're looking for something [you can use] Control F [for] find and just scan down.

One of the OER developers also observed high levels of student satisfaction with the OER textbook. She mentioned, “my students were very happy . . . that they didn't have to carry another textbook or (they) didn't have to pay for a textbook. So the main thing was then getting them to use it.” It was interesting that students and faculty mentioned the burden of carrying around heavy textbooks. This suggests that access is not only about having the money to purchase a textbook; access is also about bringing required materials to class on a regular basis. If a textbook is too big to carry around, students will be more likely to leave them behind.

Beyond cost savings and convenience, English faculty also appreciated the relevance of the OER textbook in terms of its alignment with course competencies. According to one of the OER developers:

We've both been on textbook selection committees together before . . . and we read the textbooks and we decide which one do we like the best. You're [always] choosing the lesser of two evils. This one's cheaper, but it doesn't have a grammar section and we need it. This one has a grammar section, but it doesn't have a process section. What was perfect about this [the OER textbook] was [that] every single section was stuff we use—there wasn't anything extraneous in there.

Even though one of the OER adopters missed some of the literary readings from the commercial textbook, he acknowledged that the OER textbook was more relevant to the goals of the English composition course because it provided examples “more directly applicable for students to put into their own writing.”

Research Question 6

RQ6: To what extent did student and faculty focus group data reporting on the use of OER learning materials help explain the outcomes of a treatment program designed to increase the retention rates of first year students at NCC?

In keeping with the mixed-methods research design, qualitative evidence from faculty and student focus groups provided valuable insight into the quantitative results of the outcome evaluation (Creswell & Plano-Clark, 2018). I employed both a deductive and inductive coding process to evaluate student and faculty focus group transcripts following the protocols of Miles et al. (2014).

Academic success outcomes. Emergent themes from the qualitative analysis pointed to factors that may have limited the influence of OER adoption on academic success outcomes. As already noted in the discussion on dosage, focus group data explained the wide variations in student usage of the OER textbook due to the nature of the English composition course and instructor expectations. Although all students acknowledged they had access to the textbook, it is important to recognize that access does not equate to usage. As one student stated, “I didn’t really need to use it [the OER textbook] all that much. I was just happy to have it there.”

In addition, evidence suggested that adoption of the OER textbook did little to change pedagogy. The potential certainly exists for ENGL 101N faculty to incorporate more innovative instructional approaches in response to the OER initiative. As noted by one of the OER developers, the OER textbook is a dynamic resource and English faculty are welcome to collaborate in the continuous design and development process.

So what's nice about the textbook is it's living document so we want to keep changing and adding to it. . . . And, you know, and we've made that clear to people [faculty] if you

come across . . . materials that you think would be good, not just to add to the metacourse, but to add to the textbook link, then of course that we can consider doing that.

At the end of the fall 2019 semester, however, it appears pedagogy remained largely unchanged. OER adopters, for example, mentioned using different “prewriting activities” or “more reverse outlining which I used to do anyway.” Even though OER developers envision the OER initiative as a collaborative endeavor involving the ENGL 101N faculty, one OER adopter was unclear about how to participate, “I don't know that there's a formal avenue for all of us to contribute.”

Enrollment status. As noted in the findings section, there was quantitative evidence to conclude the treatment program had a significant association with the subsequent enrollment status of ENGL 101N students in fall 2019. Qualitative analysis of student focus group interviews revealed two emergent themes that help to explain the outcome evaluation results.

First, interviews suggested that other factors beyond the text messaging campaign may have influenced the significant outcome observed. Although all three of the students recalled receiving the text and/or email, two out of three students had registered for the spring semester prior to receiving message. For one of these students, faculty advisors played an important role in prompting him to register for spring. He explained:

[My advisors] were already on it. Because they want to make sure that we get . . . I don't want to say dibs, but they're like “if you want one of these courses that are available, you sign up with me now so I can get you in it.”

The text message did not prompt the third student to register for classes before the end of the fall semester. However, he did call the text message a good reminder “just to kickstart my memory.” He stated:

People get so absorbed in their classes right now—they have finals coming up. So actually having a reminder to do something that you know you're ready to do in the beginning, [it's good] to go ahead and get on that.

Second, student interviews reinforced the importance of clear communications between college staff and students regarding enrollment status and the pathway to degree completion. It was interesting to see that two of the focus group participants equated enrollment status with the attendance patterns they had experienced in high school. Even though one student was taking 16 credits during the fall semester, he reported, “I consider myself part-time because I'm only here four days out of the week. That only takes up like, two or three hours of my day, so I wouldn't consider that full-time.”

Discussion

Using the research questions as a framework, this section will synthesize the results of the process and outcome evaluations and describe the importance of these findings within the context of the research literature.

Process Evaluation

Project implementation. Qualitative findings revealed three key factors that likely played a role in ensuring the high level of project implementation fidelity observed in this process evaluation. First, it is important to recognize the prior work of the English program coordinator to encourage greater consistency of instruction across all sections of ENGL 101N (e.g., the construction of the ENGL 101 metacourse and the distribution of an ENGL 101N model syllabus). As noted during focus group interviews, her efforts made it much easier for instructors to deploy the OER textbook as planned. Second, there seemed to be strong faculty support for the OER initiative. The goal of lowering textbook costs for community college

students clearly resonated with faculty focus group participants; and they were willing to overlook any misgivings they may have felt about switching to a free electronic textbook as long as they could save their students money. Third, the availability of professional development training and the willingness of the English program coordinator to provide ongoing support contributed to faculty buy-in. Each of these factors will be important considerations for NCC faculty seeking to expand the adoption of OER textbooks in other departments or for community college administrators and faculty seeking to implement a similar intervention in another context.

Phase two of the intervention involved a text messaging campaign to remind ENGL 101N students about the cost savings associated with the OER textbook and to encourage them to register for more credits during the spring semester. As noted in the report, the text message was successfully delivered to over 90% of ENGL 101N students. However, end-of-the-semester survey data and student focus group responses raised questions about how well the text messaging campaign had prompted students to take action and register for spring classes. For example, only 35% of survey respondents recalled receiving a text message; and two out of three focus groups participants had registered for the spring semester prior to the text messaging campaign. Although the texting campaign was a low-cost intervention that produced promising results, further research will be necessary to evaluate the effectiveness of nudging strategies (Bird et al., 2017; Castleman & Page, 2014) to increase enrollment intensity in subsequent semesters at NCC.

Barriers. During the initial planning phases of this treatment program, I anticipated a lack of computer and/or Internet access would be a serious barrier preventing ENGL 101N students from using the OER textbook posted on Canvas. This was a key consideration because community colleges typically serve a higher percentage of economically disadvantaged students

than four-year institutions (Bailey et al., 2015; Hollifield-Hoyle & Hammons, 2015). Within the treatment group, for example, 34.5% of ENGL 101N students received Pell grants in fall 2019. As a result, it was likely that economic barriers could have limited students' computer and Internet access, and ultimately, their ability to utilize the intervention. Upon completion of the process evaluation, however, students' lack of computer and Internet access was much less of a barrier than anticipated. Instead, student surveys and focus group data pointed to three potential issues that will need to be addressed in future iterations of this treatment program at NCC.

First, there appears to be a need for more technical support for students new to using Canvas. As noted earlier, nearly a quarter of survey respondents who encountered issues using the OER textbook reported difficulties with using Canvas. However, instructors are understandably reluctant to dedicate valuable class time to technology tutorials. As NCC seeks to expand the adoption of OER textbooks across the college, it may be beneficial to set up a help desk in the library where students can go for technical support. Second, student focus group participants noted the importance of having reliable Wi-Fi access at the college. As OER use grows, it may be necessary for NCC leadership to invest in additional IT infrastructure to support increased student demand. Third, both faculty and student focus group participants noticed some minor design issues and technical glitches when using the OER textbook. Although these are relatively easy fixes, they point to the fact that the OER textbook "is a living document." Without the ongoing commitment of the English program coordinator and the ENGL 101N faculty to regularly review the textbook and update issues such as broken links, it is likely minor design issues and technical glitches could become serious barriers to student access.

Dose. The process evaluation found that a high percentage of students accessed the textbook during the fall semester; however, wide variations in OER textbook usage by course

section and the low level of student exposure to the intervention posed threats to the fidelity of implementation of this treatment program. Two factors appear to explain these variations in students' textbook usage. First, students perceived the textbook as a supplemental resource (as opposed to required reading) due to the nature of the English composition course. Second, ENGL 101N instructors had different expectations to check students' understanding of the assigned readings. Some instructors quizzed students or assigned journal prompts based on the readings, while other instructors appeared to have few requirements. These findings lead to an important insight about the OER intervention—students having access to the textbook is not the same as students' using the textbook.

Outcome Evaluation

The outcome evaluation assessed the association between a two-phase treatment program administered during the fall 2019 semester at NCC and the academic success outcomes and subsequent enrollment status of first semester students enrolled in ENGL 101N.

Phase 1—open educational resources textbook adoption. This program's theory of treatment (see Figure 3) hypothesized the adoption of an OER textbook would lead to a short-term increase in the level of student engagement. This is because students have free access to course materials (Fischer et al., 2015; Hilton & Wiley, 2011) and they are more likely to complete readings prior to class (Center for Community College Student Engagement, 2017). Further, increased levels of student engagement should lead to intermediate outcomes such as higher GPAs and an increase in the fall to spring retention rates of first year students (Hilton & Laman, 2012; Price & Tovar, 2014). However, this outcome evaluation found no evidence to establish a significant association between the treatment program and academic success outcomes of ENGL 101N students at NCC. These results are aligned with the findings of

Grimaldi et al. (2019), who reported that “the majority of comparisons in the literature find null effects of OER adoption on learning outcomes” (p. 2). Similarly, Hilton (2016) reported inconsistent findings and significant limitations when he compared nine different research studies evaluating the possible influence of OER textbook adoption on the academic outcomes of college students. Hilton (2016) could draw no conclusions about a positive association between OER adoption and academic outcomes; however, he did find “that utilizing OER does not appear to decrease student learning” (p. 586).

Quantitative and qualitative data gathered at NCC during the fall 2019 semester provides some important insight into why the majority of studies (including the present study) have failed to detect a significant association between OER adoption and academic success outcomes. As noted in the logic model (Appendix D), I hypothesized the adoption of an OER textbook in ENGL 101N would contribute to higher levels of student engagement because all students would have access to the textbook. In turn, this access would enable them to complete readings as assigned and participate more actively in classroom learning activities. Grimaldi et al. (2019) have termed this the *access hypothesis* and it assumes “access is the primary mechanism for how OER might affect learning outcomes” (p. 2). Evidence from the current study points to a serious flaw in the access hypothesis—access to a textbook does not equate to usage. Despite the fact that focus group participants displayed a high level of satisfaction with the OER textbook in terms of cost savings, access, convenience, and alignment with course competencies, student usage of the textbook proved to be relatively low and it varied widely by class section. It follows that access to the textbook alone does little to improve students’ academic success. Rather, it is the quality of the faculty/student interactions (Clemens, 2016; Mitchell & Hughes, 2014; Nakajima et al., 2012; Tovar, 2015) and the way instructors and students are using the OER

learning materials that influence academic outcomes. In his commentary on the OER movement, Mishra (2017) further reinforced this point by writing, “transformation of the educational landscape and improvement in the quality of learning will be visible not because of OER per se, but due to teacher engagement with OER” (p. 378).

Building upon this idea of *teacher engagement with OER*, it appears professional development training for ENGL 101N faculty in open pedagogy (Wiley, 2013) could increase the quality of faculty/student interactions around the OER textbook and lead to improved academic outcomes for ENGL 101N students. Open pedagogy or open educational practices (OEP) center on the 4R Framework of reusing, revising, remixing, and redistributing OER learning materials (Karunanayaka, Naidu, Rajendra, & Ratnayake, 2015; Wiley, 2013). OEP not only encourages educators to use free materials, it also gives educators “the ability for repurposing them through the improvement and creation of new materials, as well as innovative teaching practices using OER” (Karunanayaka et al., 2015, p. 340). Focus group interviews with ENGL 101N faculty indicate that there is still much work to be done to realize the full potential of the OER textbook from the perspective of open pedagogy. Although the OER developers expressed a desire to have more faculty input in ongoing development of the ENGL 101N textbook, OER adopters were uncertain about the process. Further, faculty interviews suggest the availability of the OER textbook had done little to change pedagogy. OER adopters did try some new activities like writing prompts and more reverse outlining; however, their overall instructional approach seemed the same as when they used the commercial textbook.

Phase 2—text messaging campaign. The theory of treatment (see Figure 3) hypothesized the text messaging campaign would increase students’ awareness of the costs savings associated with OER along with the benefits of full-time enrollment. Further, these

short-term outcomes would result in intermediate outcomes including an increase in the fall to spring retention rate of first-year students and an increase in the number of credits attempted in the spring semester. There was no significant association between the treatment program and fall to spring retention; however, the study did find a significant association between the treatment program and spring enrollment intensity of ENGL 101N students. Although ENGL 101N students in fall 2019 enrolled in a significantly higher number of credits in the spring semester than the control group, the role played by the text messaging campaign is ambiguous.

As noted in the intervention literature review, prior studies have found that texting campaigns are effective in nudging students to take specific actions (Bird et al., 2017; Castleman & Page, 2014). This study, however, found no conclusive evidence that the text messaging campaign prompted ENGL 101N students to register for more credits during the spring semester. For example, only 35% of the students who responded to the end-of-the-semester survey recalled receiving the text and/or email message even though the text message had a 90.8% delivery rate. Further, all three of the student focus group participants recalled receiving the text and/or email message; however, two out of the three had already registered for spring classes by the time they received the text. This suggests there were other factors at work, including efforts of faculty advisors, that likely contributed to the significant increase in ENGL 101N students' subsequent enrollment status. That said, this was a no-cost, low stakes intervention. It is important not to underestimate the role it may have played as a registration reminder for ENGL 101N students who did not participate in the focus group or respond to the survey.

Further, the study highlights the importance of strengthening communication between college staff and students around enrollment status and the requirements to complete an associate's degree within a two-year timeframe. This is in keeping with the findings of Kuh et al.

(2008), who noted that “faculty and staff should clarify institutional values and expectations early and often to prospective and matriculating students” (p. 555). Student survey responses and focus group interviews indicated that NCC students are often uncertain about the number of credits they are taking in a given semester and/or the definition of full-time status. It was interesting to observe that two focus group participants determined their enrollment status based on high school attendance patterns. These findings suggest that regular text messaging campaigns combined with a marketing campaign similar to 15 to Finish (Mongold & Itano, 2017; University of Hawai‘i System, 2016) could play a role in raising students’ awareness of enrollment status and result in higher degree completion rates at NCC. This should be a topic for further study.

Limitations

Limitations of this study include threats to external validity, possible confounding factors, and the small sample size (Shadish et al., 2002). First, it is difficult to draw conclusions about this study’s external validity due to the unique context of NCC. Since 2015, the college has been involved in a statewide initiative to designed to raise the percentage of New Hampshire adults earning a post-secondary credential to 65% by 2025 (New Hampshire Coalition for Business and Education, n.d.). Within the context of the Community College System of New Hampshire, the Guided Pathways to Success Initiative (GPS) is a multi-pronged program to raise students’ retention and completion rates. GPS features specific strategies such as co-requisite remediation to allow developmental mathematics and English students participate in college level coursework; structured scheduling so students can earn more credits per semester due to fewer scheduling conflicts; and proactive advising to encourage students to take 12 or more credits each semester to maintain their full-time status. Due to the college’s involvement in the

GPS initiative, the generalizability of the study's findings to other community college contexts is questionable.

Further, the presence of the GPS initiative at NCC may introduce several confounding variables that limit the validity of the results. It is important to note that each of these GPS protocols (i.e., co-requisite remediation, structured scheduling, and proactive advising) was in place in fall 2018 as well as fall 2019. It is possible, however, that the significant increase in enrollment intensity for students in the fall 2019 cohort may partially be related to factors associated with the GPS initiative such as improvements in advisor messaging during registration.

A third limitation is related to the study's small sample size. It has already been noted that the small number of accelerated ENGL 101N sections in fall 2019 may have skewed the quantitative results on student textbook usage by course format. Further, the difference in student textbook usage by instructor experience would likely have been found to be significant with a larger sample size. Although qualitative results played an important role in validating and explaining quantitative results, it is also important to note the small number of student focus group participants (N=3) limited student voice.

Implications for Practice and Future Research

There are three key implications for practice and future research resulting from this study. First, this study found no evidence to suggest that OER adoption contributed to any changes in the academic success outcomes of first year students enrolled in ENGL 101N at NCC. While this may be true, how can NCC's faculty and administration justify students paying the additional cost of a commercial textbook if there is no significant difference in ENGL 101N student

achievement when using a commercial textbook versus a free OER textbook? This is in keeping with the conclusion of Hilton (2016), who summed it up this way:

Because . . . the use of OER does not appear to negatively influence student learning, one must question the value of traditional textbooks. If the average college student spends approximately \$1000 per year on textbooks and yet performs scholastically no better than the student who utilizes free OER, what exactly is being purchased with that \$1000?
(p. 588)

Moving forward, it will be important to conduct studies similar to the ENGL 101N study across departments at NCC to assess the value of commercial textbooks in different disciplines. If the same null effects are found, the next steps will be to scale up OER adoption across the college to provide more significant cost savings for NCC students. Because NCC students identified financial pressure as an important factor influencing their enrollment decisions, it is possible more significant costs savings could lead to increased enrollment intensity and more students graduating within a three-year timeframe. This could be another topic for further study.

Second, this study highlights the importance of strengthening communications to students about their enrollment status and the pathway to degree completion. This study found a significant association between the treatment program and ENGL 101N students' subsequent enrollment status. Although findings were inconclusive as to how much the text messaging campaign may have prompted ENGL 101N students to register for more credits in the spring semester, it was a no-cost intervention that could have been one of the factors contributing to the significant results. Because many NCC students express uncertainty about their enrollment status (i.e., full-time versus part-time) or even the number of credits they are taking each semester, it will be important for college staff to develop a formal communications plan so students will

understand how enrollment status relates to degree completion. Building upon the findings of this study this formal communications plan should include two components: 1) a marketing campaign similar to 15 to Finish (Mongold & Itano, 2017) to raise students' awareness of the benefits of full-time enrollment; and 2) text messaging campaigns scheduled at regular intervals during the academic year to prompt students to register for more credits. Even for those students who are unable to attend classes on a full-time basis, it follows they would still benefit from clearer institutional messaging about the most direct pathway to degree completion. Future studies would be necessary to fully evaluate the association of a formal communications plan with students' subsequent enrollment status and associate's degree completion rates.

Third, this study noted an important limitation in the access hypothesis. Although OER may provide greater access to learning materials, this will have no impact on academic success outcomes if a student is not using the textbook. Instead the key to improving academic success outcomes appears to be related to how well the instructor and students are actually engaging with OER learning materials in the classroom. Here the idea of open pedagogy (Karunanayaka et al., 2015) offers a promising implication for practice because it allows students to fully utilize free, high quality learning materials within the context of innovative student-centered instruction. In the next iteration of the OER project at NCC, it would be beneficial to provide training in open pedagogy for ENGL 101N faculty. This could be followed by the establishment of a professional learning community (Cochran, 2015; Darling-Hammond, Hyler, & Gardner, 2017) where faculty could experiment with new approaches to utilizing the OER textbook, share their findings, and make meaningful changes to practice. In future research, it would be possible to compare the academic success outcomes of ENGL 101N students in the current study with those of students whose instructors had participated in open pedagogy training. If a significant difference is

observed, it would be important for the college to invest in additional open pedagogy training as OER adoption is extended into other departments. As noted by Karunanayaka et al. (2015), “the adoption of OER as an innovation will be truly effective only if it reflects a change in the thinking, mindsets and actions of change agents” (p. 341).

Conclusions

The purpose of this study was to evaluate a two-phase program designed to improve the academic success outcomes and subsequent enrollment status of first year students at NCC. For community college administrators, faculty, and staff seeking evidence-based strategies to raise the retention and completion rates of their students, two promising findings emerged. First, analyses found no significant difference in the academic outcomes of English composition students who used a commercial textbook versus those who used a no-cost OER textbook. This result is noteworthy because the cost of attendance is a serious barrier to persistence for many community college students (Hicks et al., 2014; Hollifield-Hoyle & Hammons, 2015; McKinney & Burrige, 2015). Although further research will be necessary, it follows that lowering the cost of attendance by expanding OER adoption beyond one course could have a positive influence on students’ enrollment status and long-term outcomes including transfer and degree completion.

Second, the study did find evidence of a significant association between the text messaging campaign and an increase in students’ enrollment intensity during the spring semester. As already noted, enrollment status is a defining variable linked to nontraditional student attrition (Bean & Metzner, 1985). Because nontraditional students typically attend college on a part-time basis, they are less likely to graduate as compared to students who attend on a full-time basis (Crosta, 2014; Fike & Fike, 2008; Juskiewicz, 2017; Klempin, 2014). This lack of enrollment intensity can be further compounded by a lack of information. Because two-

year colleges typically serve a higher proportion of first-generation students than four-year institutions (Morest, 2013), community college students are more likely to have questions about the requirements to transfer or graduate on time. As evidenced by this study, community college administrators, faculty, and staff should not underestimate the importance of clearly communicating institutional expectations to students (Kuh et al., 2008). Text messaging campaigns to prompt students to maintain their enrollment continuity while increasing their enrollment intensity, particularly during the first year, could be one low-cost strategy for raising the transfer and degree completion rates of community college students.

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Appendix A

Observation Notes

Context

My first observation took place on Tuesday, January 30, 2018 from 9:20 am to 9:50 am. The location was the cafeteria at Nashua Community College. Since my problem of practice focuses on low retention and completion rates among community college students, my idea was to observe student activity levels and numbers in a location that sits at the heart of our campus. I am a non-participant observer (Lochmiller & Lester, 2017).

Observation Notes

When I arrive, ten students are seated individually around the room. Most are listening to headphones while using phones or computers.

I seat myself at a table at the back of the cafeteria so I can observe the scene.

On the mezzanine, I can see students seated in the chairs. They are engaged in similar activities as those at the tables.

Three students pass through the cafeteria. I'm guessing they are in the automotive program based on their clothing. One stops in the kitchen to buy a beverage. They proceed towards the automotive building.

It's VERY quiet.

The weather outside is cloudy and chilly. There is a gas fireplace in the center of the room, but it's not running.

One student is joined at a table by a classmate. They talk quietly while looking at their phones. I can't hear what they're discussing.

Occasionally, one of two people pass through the area from the main building to Judd Gregg Hall or vice versa.

There seems to be a culinary class going on because once in a while a student emerges or enters that area dressed in chef's clothing.

Another student is joined by a classmate. He is greeted with "hi buddy." I can only hear parts of the discussion that include mention of PayPal and the cost of items. I get the impression they are talking about video gaming, but I can't be sure.

Students all appear to be traditionally aged (18-25 years old) and a mix of male and female. There is also some diversity (e.g., White and African American).

One student purchases a beverage and a breakfast sandwich. He sits and eats alone.

A few students stop at the vending machines.

Around 9:50 am, activity picks up a bit as students are passing through or getting up to go to class. By 9:52 am, the area is nearly deserted (see Figure A1).

Reflection/Meta-Level Observations

Although our enrollment is down 15% this spring, I was surprised by the lack of activity on a Tuesday morning. Typically, Tuesdays and Thursdays between 10 am and 1 pm are very popular class times. In semesters past, it has been difficult to find an empty classroom during this timeslot. The lack of student interaction suggests a lack of engagement with the campus community. With the exception of myself and a faculty member buying a beverage, there is no faculty/staff presence in the cafeteria. Although the facilities are clean and attractive, there is no reason for students to linger. This observation lends support to the idea that theoretical models that apply to four-year students may need to be adapted to fit the community college context. According to Martin et al. (2014), Tinto's (1975) model of student persistence has limited

relevance for community college students since there are few opportunities for academic and social integration outside of the classroom.



Figure A1. Nashua Community College cafeteria at 9:52 a.m. on Tuesday, January 30, 2018. I conducted this observation as part of an assignment in my Research Methods and Systematic Inquiry I course (ED.883.718). The findings provided direction for my needs assessment study, conducted in spring 2018.

Appendix B

Community College Survey of Student Engagement Sample Items

Item	Description
Faculty–student interaction benchmark	
4j	Frequency: used e-mail to communicate with an instructor
4k	Frequency: discussed grades or assignments with an instructor
4l	Frequency: talked about career plans with an instructor or advisor
4m	Frequency: discussed ideas from your readings or classes with instructors outside of class
4n	Frequency: received prompt feedback (written or oral) from instructors on your performance
4p	Frequency: worked with instructors on activities other than coursework
Support for learners benchmark	
9b	Amount of emphasis by college: providing the support you need to help you succeed at this college
9c	Amount of emphasis by college: encouraging contact among students from different economic, social, and racial or ethnic backgrounds
9d	Amount of emphasis by college: helping you cope with your non-academic responsibilities (work, family, etc.)
9e	Amount of emphasis by college: providing the support you need to thrive socially
9f	Amount of emphasis by college: providing the financial support you need to afford your education
12a1	Frequency of use: academic advising/planning
12b1	Frequency of use: career counseling

Note. Adapted from *Community College Survey of Student Engagement* (p. 1-3), by Center for Community College Student Engagement, 2017 (http://www.ccsse.org/refresh/CCSSE_Refresh_Sample.pdf). Copyright 2017 by The University of Texas at Austin. Adapted with permission.

Appendix C

Student Focus Group Interview Schedule for Needs Assessment Study

Welcome and thank you for agreeing to participate in this focus group. For those of you who don't know me, my name is Robyn Griswold. I currently serve as the Vice President of Academic Affairs at NCC. Last year I returned to graduate school because I want to learn more about strategies that improve academic outcomes for community college students. I'm especially interested in studying enrollment patterns.

Results from this focus group will help me learn more about the factors that influence student enrollment decisions.

You were invited to participate in this focus group given your experiences as current NCC students.

At this point, I will take a moment to explain the consent forms that are required for any research study and answer any questions.

- As this form explains, your participation is optional, and you may stop participating at any point in the discussion.
- All information shared will be strictly confidential.
- We will be on a first name basis only, "and I won't use any names in my report"
- The maximum time allowed for our focus group will be one hour.
- It would be helpful for me in analyzing the information from this discussion if I could make a tape recording. I am the only one who would have access to it, and it will be destroyed after I have a transcript of the discussion. Does anyone object to that?

(Distribute consent forms, answer student questions, and collect signed forms.)

Now for a few ground rules before we begin:

- There are no right or wrong answers. Please feel free to share your point of view even if it differs from what others have said.
- Please speak one at a time since I will be tape recording the conversation. I don't want to miss any information.

Let's start by going around the table and introducing ourselves.

- 1) Please tell me your first name, your major, and a few words about why you chose NCC?
- 2) How many people here consider themselves to be part-time? Full-time?
- 3) How many credits are you taking this semester?

For the next part of our conversation, I'm going to mention several different factors that may affect student enrollment decisions. After each factor, I'll stop and ask you how likely (or not likely) it was that this factor influenced your choices when registering for classes this current semester. If you feel like something was a big issue for you (or someone you know), I'll ask you to explain more of the specifics.

- 4) Required courses were not offered
- 5) Required courses were not offered at convenient times
- 6) Four or five classes in one semester would be too academically challenging
- 7) Responsibilities outside of school (work and/or family) are time consuming
- 8) Lack of funding/inadequate financial aid
- 9) Personal health issues
- 10) Lack of reliable transportation
- 11) Inadequate guidance from faculty and staff on course selection
- 12) Are there any factors that I missed?

To wrap up today's discussion, I'd like to go around the table and ask each person one last question.

- 13) If you could do one thing to increase transfer and degree completion rates at NCC, what would it be?

The purpose of today's focus group was to learn more about the factors that influence student enrollment decisions.

I will now attempt to sum up the main points of today's discussion. (Discussion is summarized)

- 14) Is there anything that I missed?

Thank you very much for your time this afternoon. I enjoyed our conversation! Once I have completed my analysis of the data, I would like to get your feedback on the results. If that's something you think you would have time to do, please be sure I have your email address before you leave today. I'll be back in touch over the summer. Thanks again for all of your help!

Appendix D

Logic Model Depicting an Intervention to Address the Problem of Low Retention Rates at Nashua Community College

Program: Open Educational Resources (OER) Logic Model

Situation: The retention rates of students attending Nashua Community College in Nashua, New Hampshire are much too low. A needs assessment conducted in spring 2018 suggested that enrollment patterns, student engagement levels, and the cost of college attendance are important factors affecting this problem.

Inputs	Outputs		Outcomes – Impact		
	Activities	Participation	Short	Medium	Long
1. Engagement of key stakeholders ~ Administrative support at both system and college level ~ Buy-in of English faculty and department chair ~ Support from college librarian (e.g., assisting OER ambassadors in locating materials) ~ Support from online learning specialist to post OER materials on Canvas ~ Support from institutional researcher to collect data ~ Support from advising center to send texting campaign to ENGL 101N students 2. \$750 stipends for OER ambassadors (1 full-time and 3 part-time English faculty) 3. Time for OER ambassadors to research best practices and select materials 4. Access to learning management system (Canvas) to build a metacourse to be shared with all ENGL 101N instructors. 5. Set up designated writing lab 6. Funding to purchase new laptops for library	1. OER ambassadors (English faculty: 1 full-timer and 3 adjuncts) will select new course materials with support of college librarian and directly align these materials with established course competencies. 2. OER ambassadors will build metacourse on Canvas to facilitate the adoption of OER materials by all faculty teaching sections of English composition. 3. Two hours of training for English faculty (@ \$40/hour) to introduce the metacourse. 4. Replacement of the commercial textbook* with no cost, open educational resources (OER) in all sections of English composition in fall 2019. *Cost of this textbook is listed on the bookstore's website at \$115.75 for a used paperback 5. Texting campaign in November 2019 (two texts sent one week apart) to remind all students enrolled in English composition about the benefits of full-time enrollment.	1. OER ambassadors (English faculty: 1 full-timer and 3 adjuncts) 2. Adjunct faculty teaching additional sections of ENGL 101N (n≈10) 3. Students enrolled in a section of ENGL 101N in fall 2019 (limit to first time freshmen, n≈400) 4. College librarian 5. Advising center director	Increase in levels of student engagement. ~Students have access to course materials when the semester begins ~Students complete assigned readings ~Students are prepared to engage in class discussion ~Students see relevance of readings since materials are directly aligned with course competencies. ~Faculty have the flexibility to choose materials that resonate with their students. ~Students may have an opportunity to produce their own content to contribute to OER Increase in percentage of students completing ENGL 101N with a C or better. Availability of additional funds to cover educational costs. Increase in student awareness of the benefits of full-time enrollment.	Increase in fall to spring retention rate of first-year students. Increase in average GPA of first-year students. Increase in the average number of credits attempted in second semester. Increase in the average number of credits earned in the second semester.	Increase in the graduation and/or transfer rates of NCC students within a three year timeframe (a 150% time to degree completion).

Assumptions

1. OER ambassadors and other ENGL 101N faculty will be willing to participate in this program evaluation.
2. OER ambassadors and other ENGL 101N faculty deploy the program consistently and as designed.
3. Other ENGL 101N faculty will be willing to devote time to adapt to new course materials. Faculty are typically reluctant to switch textbooks.
4. College librarian provides necessary support for OER ambassadors.
5. Advising center is willing to send out a separate texting campaign to all ENGL 101N students at the beginning of the spring registration cycle.
6. Buy-in from other key stakeholders
7. Students will have computer and Internet access to utilize intervention

External Factors

1. Heavy reliance on adjunct faculty (the majority of ENGL 101N sections will be taught by part-timers)
2. If professional development is required for adjunct faculty, costs could be a barrier (collective bargaining agreement requires compensation in the amount of \$40/hour).
3. Time to develop OER materials will be a consideration; English composition faculty typically have a heavy teaching load (e.g., correcting, class size) compared to faculty in other departments.
4. A lack of buy-in from ENGL 101N faculty who are not OER ambassadors – it will be important to support them transitioning to new course materials.
5. Other ENGL 101N faculty may present program differently from the program developers (the OER ambassadors) – lack of consistency in delivery.
6. To date, college librarian has not engaged in OER initiative. A lack of support could overburden English faculty and jeopardize success of program.
7. Students may not have Internet access at home and/or limited time to use computers available at NCC library and Academic Support Center.

Rev. 7/09

Appendix E

Copy of Open Educational Resources Textbook Page From the College's Learning Management System (Canvas)

NCC ENGL101 COLLEGE COMPOSITION TEXTBOOK TABLE OF CONTENTS

PREWRITING

- [Really? Writing? Again?](#)
- [What does your Professor want? Understanding the Assignment](#)
- [What is an essay: an idea](#)
- [Prewriting techniques with videos](#)
- [Introduction to the Writing Process](#)
- [Outcome: Topic Selection](#)
- [Back to the Future of Topics](#)
- [Developing Your Topic video](#)
- [Outcome: Prewriting](#)
- [Prewriting strategies](#)
- [Rhetorical Context](#)

THESIS

- [Evolution of the Thesis Statement video](#)
- [Thesis Statements](#)
- [Thesis Explained Video](#)
- [Effective Thesis Statements](#)
- [Working Thesis Statements](#)

ESSAY STRUCTURE

- [The Perfect Paragraph](#)
- [Intros and Outros](#)
- [Clarity and Concision](#)
- [Organizing an Essay](#)
- [Creating Paragraphs](#)
- [Paragraphs](#)
- [Conclusions](#)
- [Comparative Chart of Writing Strategies](#)
- [Moving Beyond the Five-Paragraph Theme](#)

DRAFTING

- [The First Draft is the Ugliest](#)
- [Revising and Writing a Second Draft](#)
- [Conclusions](#)
- [Outcome Drafting](#)
- [From Outlining to Drafting](#)
- [Drafting Video](#)

PEER EDITING/REVISING

- [Peer Review \(Video\)](#)
- [Revising Drafts](#)
- [Concerns About Revision](#)
- [Why and How to Proofread](#)
- [Peer Review Checklist](#)
- [The Art of Re-Seeing \(video\)](#)

MECHANICS

- [Getting the Mechanics Right](#)
- [Grammar and Mechanics mini lesson](#)
- [Mini-Lesson: Subjects and Verbs, Irregular Verbs, Subject Verb Agreement](#)
- [Mini Lesson: Sentence Types](#)
- [Mini Lesson: Fragments](#)
- [Mini Lesson: Run-Ons and Comma Splices](#)
- [Mini Lesson: Comma Usage](#)
- [Mini Lesson: Parallelism](#)
- [Mini Lesson: Apostrophe](#)
- [Mini Lesson: Capital Letters](#)

PROPER USE OF SOURCES FOR RESEARCH

- [Outcome: Writing Ethically](#)
- [Defining Plagiarism](#)
- [Avoiding Plagiarism](#)
- [Using Sources in Your Writing](#)

RESEARCH: SOURCE ANALYSIS

- [Reading and Using Your sources](#)
- [Evaluating Sources \(video\)](#)
- [Evaluating Websites](#)
- [Synthesizing Sources](#)

RESEARCH: FINDING SOURCES

- [The Research Process](#)
- [Using Google](#)
- [Advanced Search Strategies \(How to read a scholarly article video\)](#)
- [How to search Databases](#)

MLA DOCUMENTATION

- [Intro to MLA Documentation](#)
- [MLA Formatting](#)
- [MLA Works Cited](#)
- [Creating MLA Citations](#)
- [MLA In- text Citations](#)
- [MLA Check](#)

NARRATIVE

- [Introduction to Narrative Essay](#)
- [Student Sample Narrative](#)
- [Professional Essay: 69 Cents by Gary Shteyngart](#)
- [The Danger of a Single Story—narrative TED Talk](#)
- [How to write an annotation](#)
- [Writing for Success: Narration](#)

COMPARE & CONTRAST

- [Introduction to Compare Contrast](#)
- [A South African Storm](#)
- [The Purpose of Compare/Contrast in Writing](#)

CAUSE AND EFFECT

- [Writing for Success: Cause and Effect](#)
- [Women in Science](#)
- [Student Sample Cause and Effect Essay: Video Game Addiction:](#)

PERSUASION

- [Introduction to Argument](#)
- [The Case Against Torture](#)
- [The Case for Torture](#)
- [Writing for Success: Argument](#)

Appendix F

Focus Group Interview Schedule for Students

Welcome and thank you for agreeing to participate in this focus group! For those of you who don't know me, my name is Robyn Griswold. I currently serve as the Vice President of Academic Affairs at NCC.

You were invited to participate in this focus group given your experience as a current English composition student.

At this point I'll take a moment to go over the ground rules.

- Is everyone 18 years of age or older? Is everyone currently enrolled in an NCC program?
- There are no right or wrong answers. Please feel free to share your point of view even if it differs from what others have said" (Krueger, 2002, p. 4)
- We will be on a first name basis only, "and I won't use any names in my report" (Krueger, 2002, p. 4).
- All information shared will be strictly confidential.
- Does anyone object to my recording our conversation?
- Please speak one at a time so I don't miss any information.
- The maximum time allowed for our focus group will be one hour.
- You have the option to stop participating at any point in the discussion.

(Distribute consent forms, answer student questions, and collect signed forms.)

Any questions?

Let's start by going around the table and introducing ourselves.

- 1) Please tell me your first name, your major, and a few words about why you chose NCC?
- 2) How many people here consider themselves to be part-time? Full-time?
- 3) How many credits are you taking this semester?

For the next part of our conversation, I would like to hear about your experiences using open educational resources in your English class.

- 4) How did you feel when you learned there was no textbook required for English composition?
- 5) Please describe any issues you have encountered accessing the online learning materials provided by your English professor.
- 6) How often do you go to English class without reading the materials ahead of time?
- 7) How does this compare to your other classes?

- 8) How would you describe the quality of the online learning materials in your English class?
- 9) How does this compare with the textbook or learning materials in your other classes?
- 10) What was the best thing about using open educational resources in your English class this semester?
- 11) What was the worst thing about using open educational resources in your English class this semester?
- 12) Are you registered for next semester? If so, how many credits are you taking? If you are not registered, would you mind telling me why?
- 13) Do you remember receiving a text message or an email about spring registration?
- 14) To what extent did those text messages influence your decisions about spring course registration?
- 15) Would you be interested in taking another course at NCC that used open educational resources instead of a textbook? Why or why not?

The purpose of today's focus group was to learn more about your experiences using open educational resources in English composition. I will now attempt to sum up the main points of today's discussion. (Discussion is summarized)

- 16) Is there anything that I missed?

Thank you for your participation today!

Appendix G

Focus Group Interview Schedule for Faculty

Discuss consent forms, reminding participants of voluntary nature of the focus group, that they can decline to participate now or at any time. Ask permission for recording (recording will not occur if there is any one who does not give consent). Ask if there any questions.

Let's start by going around the table and introducing ourselves.

- 1) Please tell me your first name, how long you have been teaching at NCC, and what other classes you teach besides English composition.
 - 2) What section of ENGL 101N did you teach this semester (face to face, online, or short course format)
- For the next part of our conversation, I would like to hear about your experiences using open educational resources in your English class.
- 3) What were your thoughts when you learned we would no longer be using the English composition textbook?
 - 4) Tell me about the professional development training on the using the metacourse if you were able to attend.
 - 5) Please describe any issues you have encountered while using the OER learning materials in your section of ENGL 101N this semester.
 - 6) This is for those of you who taught English Composition at NCC last year. Compared to your last year's English composition students, how did students in your sections this year perform?
 - 7) How, if at all, did you adapt your teaching or assessment methods to align with the OER learning materials?
 - 8) Compared to last year's English composition students, how did students in this year's section respond to the OER learning materials?
 - 9) How do you think the quality of OER learning materials compares to the quality of the textbook?

The purpose of today's focus group was to learn more about your experiences using open educational resources in English composition. I will now attempt to sum up the main points of today's discussion. (Discussion is summarized)

- 10) Is there anything that I missed or anything else that you would like me to know about your experience this semester?

Appendix H

Sample Informed Consent Form for Program Evaluation

**JOHNS HOPKINS UNIVERSITY
HOMEWOOD INSTITUTIONAL REVIEW BOARD (HIRB)
RESEARCH PARTICIPANT INFORMED CONSENT FORM**

Study Title: Evaluating the influence of open educational resources on community college students' experience

Application No.: ***HIRB00009654***

Principal Investigator: Dr. Martha Mac Iver, Associate Professor,
Johns Hopkins School of Education,
2800 N. Charles Street, Baltimore, MD 21218
mmaciver@jhu.edu, (410) 516-8256

You are being asked to join a research study. Participation in this study is voluntary. Even if you decide to join now, you can change your mind later.

1. Research Summary (Key Information):

The information in this section is intended to be an introduction to the study only. Complete details of the study are listed in the sections below. If you are considering participation in the study, the entire document should be discussed with you before you make your final decision. You can ask questions about the study now and at any time in the future.

The purpose of this research study is to evaluate how the use of open educational resources in all sections of English composition (ENGL 101N) may influence community college students' experience. Open educational resources are free course materials that will be used in place of the traditional English composition textbook beginning in fall 2019.

Participants in this study will describe their experiences using open educational resources in an English composition class at Nashua Community College during a focus group interview. Student participants will be asked to contribute to two focus group interviews – one at the middle of the semester and one at the end of the semester. Faculty participants will be invited to take part in one focus group interview at the end of the semester. All focus group interviews will last one hour and there are no costs associated with participation.

We anticipate that approximately four to five ENGL 101N students and four to five ENGL 101N faculty will participate in this study.

The risks associated with participation in this study are no greater than those encountered in daily life. The study may benefit society if the results lead to a better understanding of strategies that could improve the experience of community college students.

2. Why is this research being done?

This research is being done to evaluate how the use of open educational resources in all sections of English composition may influence community college students' experience.

The study population consists of first year students enrolled in ENGL 101N at Nashua Community College. Participants must be 18 years of age or older and matriculated in a degree or certificate program. The study population also includes faculty teaching sections of ENGL 101N during the fall 2019 semester at Nashua Community College.

3. What will happen if you join this study?

If you agree to be in this study, we will ask you to do the following things:

- Describe your experiences using open educational resources in ENGL 101 during the fall 2019 semester
- Student participants will take part in two focus group interviews at Nashua Community College – one in the middle of the semester and one at the end. Student participants will be asked to participate in both interviews.
- Faculty participants will take part in one focus group interview at the end of the semester. The location will be Nashua Community College.
- All participants will be asked to set aside one hour for each interview.

Photographs/Video recordings:

As part of this research, we are requesting your permission to create and use an audio recording of each focus group interview. No audio recording will be used for advertising or non-study related purposes.

You should know that:

- You may request that the audio recording be stopped at any time.
- If you agree to allow the audio recording and then change your mind, you may ask us to destroy that recording. If the recording has had all identifiers removed, we may not be able to do this.
- We will only use these recordings for the purposes of this research and it will be destroyed once a transcript of the recording has been produced.
- The audio recording will be transcribed by an outside company that has agreed to keep all data confidential.

How long will you be in the study?

You will be in this study for the duration of the fall 2019 semester (August 26, 2019 to December 16, 2019).

4. What are the risks or discomforts of the study?

You may get tired or bored when I am asking you questions. You do not have to answer any question you do not want to answer.

The risks associated with participation in this study are no greater than those encountered in daily life.

Are there benefits to being in the study?

There is no direct benefit to you from being in this study.

This study may benefit society if the results lead to a better understanding of strategies that could improve the experience of community college students.

5. What are your options if you do not want to be in the study?

Your participation in this study is entirely voluntary. You choose whether to participate.

An alternative is to not take part in the study. If you decide not to participate, there are no penalties, and you will not lose any benefits to which you would otherwise be entitled.

6. Will you be paid if you join this study?

No.

7. How will the confidentiality of your data be protected?

Any study records that identify you will be kept confidential to the extent possible by law. The records from your participation may be reviewed by people responsible for making sure that research is done properly, including members of the Johns Hopkins University Homewood Institutional Review Board and officials from government agencies such as the National Institutes of Health and the Office for Human Research Protections. (All of these people are required to keep your identity confidential.) Otherwise, records that identify you will be available only to people working on the study, unless you give permission for other people to see the records.

Any reference to participants' names in audio recordings will be removed from focus group data during the transcription process. All paper documents will be kept in a locked file that is only accessible to the student researcher. Audio recordings will be

erased after interviews have been transcribed.

8. What other things should you know about this research study?

What is the Institutional Review Board (IRB) and how does it protect you?

This study has been reviewed by an Institutional Review Board (IRB), a group of people that reviews human research studies. The IRB can help you if you have questions about your rights as a research participant or if you have other questions, concerns or complaints about this research study. You may contact the IRB at 410-516-6580 or hirb@jhu.edu.

What should you do if you have questions about the study?

Call the principal investigator, Dr. Martha Mac Iver at (410) 516-8256. If you wish, you may contact the principal investigator by letter. The address is on page one of this consent form. If you cannot reach the principal investigator or wish to talk to someone else, call the IRB office at 410-516-5680.

You can ask questions about this research study now or at any time during the study, by talking to the researcher(s) working with you or by calling Robyn Griswold, student investigator at 603-882-6923 x 1443.

If you have questions about your rights as a research participant or feel that you have not been treated fairly, please call the Homewood Institutional Review Board at Johns Hopkins University at (410) 516-6580.

9. What does your signature on this consent form mean?

Your signature on this form means that: You understand the information given to you in this form, you accept the provisions in the form, and you agree to join the study. You will not give up any legal rights by signing this consent form.

WE WILL GIVE YOU A COPY OF THIS SIGNED AND DATED CONSENT FORM

Signature of Participant	(Print Name)	Date/Time
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Signature of Person Obtaining Consent	(Print Name)	Date/Time
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NOTE: A COPY OF THE SIGNED, DATED CONSENT FORM MUST BE KEPT BY THE PRINCIPAL INVESTIGATOR; A COPY MUST BE GIVEN TO THE PARTICIPANT.

Appendix I

Survey Administered to ENGL 101N Students at Start of Fall 2019 Semester

Beginning of Semester Survey

Start of Block: Default Question Block

Q1 We are conducting a survey to understand student experiences at Nashua Community College. By completing this survey or questionnaire, you are consenting to be in this research study. Your participation is voluntary and you can stop at any time. You must be 18 or older to complete this survey.

Q2 What is your age?

- ☐ 17 or less than 17 years old (1)
- ☐ Between 18 and 25 years old (2)
- ☐ Over 25 years old (3)

Skip To: End of Survey If What is your age? = 17 or less than 17 years old

Q3 What is your gender?

☐ Male (1)

☐ Female (2)

☐ Prefer not to say (3)

☐ Prefer to self-describe (4) _____

Q4 Which program have you enrolled in at NCC?

☐ Write program name (1) _____

☐ I'm not enrolled in a program (2)

☐ I'm not sure (3)

Q5 Have you ever taken English composition at NCC or at another college before?

☐ Yes (1)

☐ No (2)

Q6 How many courses are you taking at NCC this semester?

- ☐ 1 (1)
 - ☐ 2 (2)
 - ☐ 3 (3)
 - ☐ 4 (4)
 - ☐ 5 (5)
 - ☐ More than 5 (6)
-

Q7 How many credits are you taking this semester?

- ☐ Less than 9 credits (1)
 - ☐ Between 9 and 12 credits (2)
 - ☐ Between 13 and 15 credits (3)
 - ☐ Over 15 credits (4)
 - ☐ I'm not sure (5)
-

Q8 What is your level of experience with online learning?

- ☐ Very experienced (1)
 - ☐ Some experience (2)
 - ☐ Little experience (3)
 - ☐ No experience (4)
-

Q9 Do you have a laptop or tablet that you can bring to class?

- ☐ Yes, I can bring a laptop to every class. (1)
 - ☐ Yes, I can bring my laptop to most classes. (2)
 - ☐ Yes, but I won't be able to bring it often. (3)
 - ☐ No, I don't have a laptop to bring to class. (4)
-

Q10 Do you have a computer (or laptop) that you can use at home to complete assignments?

- ☐ Yes, I have a computer at home that I can use at any time. (1)
- ☐ Yes, I have a computer at home that I can use most of the time. (2)
- ☐ Yes, I have a computer at home, but I don't always get to use it. (3)
- ☐ No, I don't have a computer at home that I can use. (4)

Skip To: Q4 If Do you have a computer (or laptop) that you can use at home to complete assignments? = Yes, I have a computer at home that I can use at any time.

Skip To: Q4 If Do you have a computer (or laptop) that you can use at home to complete assignments? = Yes, I have a computer at home that I can use most of the time.

Skip To: Q5 If Do you have a computer (or laptop) that you can use at home to complete assignments? = Yes, I have a computer at home, but I don't always get to use it.

Skip To: Q5 If Do you have a computer (or laptop) that you can use at home to complete assignments? = No, I don't have a computer at home that I can use.

Q11 Do you have Internet access at your home for completing homework assignments?

- ☐ Yes, I have reliable Internet at home that I can use at any time. (1)
- ☐ Yes, I have reliable Internet at home that I can use most of the time. (2)
- ☐ Yes, I have an Internet connection, but it's not always reliable where I live. (3)
- ☐ No, I don't have an Internet connection at home. (4)

Skip To: Q5 If Do you have Internet access at your home for completing homework assignments? = Yes, I have an Internet connection, but it's not always reliable where I live.

Skip To: Q5 If Do you have Internet access at your home for completing homework assignments? = No, I don't have an Internet connection at home.

Skip To: Q6 If Do you have Internet access at your home for completing homework assignments? = Yes, I have reliable Internet at home that I can use at any time.

Skip To: Q6 If Do you have Internet access at your home for completing homework assignments? = Yes, I have reliable Internet at home that I can use most of the time.

Q12 Can you get computer and Internet access for at least eight hours per week in another location such as the NCC Library or your public library?

- ☐ Yes, I will be able to get computer and Internet access at another location every week. (1)
- ☐ Yes, I will be able to get computer and Internet access at another location most weeks. (2)
- ☐ Yes, I will be able to get computer and Internet access at another location, but it will be for less than eight hours each week. (3)
- ☐ No, I cannot get computer or Internet access at another location for at least eight hours per week. (4)

Q13 To be successful in this class, you will need to have computer and Internet access for a minimum of eight hours per week. In the space below, please describe any issues that may make it difficult for you to meet this requirement.

End of Block: Default Question Block

Appendix J

Survey Administered to ENGL 101N Students at End of Fall 2019 Semester

End of Semester Survey

Start of Block: Default Question Block

We are conducting a survey to understand student experiences at Nashua Community College. By completing this survey or questionnaire, you are consenting to be in this research study. Your participation is voluntary and you can stop at any time. You must be 18 or older to complete this survey.

Q1 What is your age?

- ☐ 17 or less than 17 years old (1)
- ☐ Between 18 and 25 years old (2)
- ☐ Over 25 years old (3)

Skip To: End of Survey If What is your age? = 17 or less than 17 years old

Q2 What is your gender?

☐ Male (1)

☐ Female (2)

☐ Prefer not to say (3)

☐ Prefer to self-describe (4) _____

Q3 Which program have you enrolled in at NCC?

☐ Write program name (1) _____

☐ I'm not enrolled in a program (2)

☐ I'm not sure (3)

Q4 How many courses are you taking at NCC this semester?

- ☐ 1 (1)
 - ☐ 2 (2)
 - ☐ 3 (3)
 - ☐ 4 (4)
 - ☐ 5 (5)
 - ☐ More than 5 (6)
-

Q5 How many credits are you taking this semester?

- ☐ Less than 9 credits (1)
 - ☐ Between 9 and 12 credits (2)
 - ☐ Between 13 and 15 credits (3)
 - ☐ Over 15 credits (4)
-

Q6 Did you experience any issues that made it difficult for you to use the online course materials this semester?

- ☐ Yes, I encountered many issues. (1)
- ☐ Yes, I encountered some issues. (2)
- ☐ Yes, but they were only minor issues. (3)
- ☐ No, I did not encounter any issues. (4)

Skip To: Q7 If Did you experience any issues that made it difficult for you to use the online course materials t... = Yes, I encountered many issues.

Skip To: Q7 If Did you experience any issues that made it difficult for you to use the online course materials t... = Yes, I encountered some issues.

Skip To: Q7 If Did you experience any issues that made it difficult for you to use the online course materials t... = Yes, but they were only minor issues.

Skip To: QID19 If Did you experience any issues that made it difficult for you to use the online course materials t... = No, I did not encounter any issues.

Q7 Please check the issue(s) that made it difficult for you to use the online course materials. (You may check more than one issue.)

☐

I don't have a computer at home. (1)

☐

I don't have Internet access at home. (2)

☐

My computer broke down in the middle of the semester. (3)

☐

I needed more technical support. (4)

☐

I had difficulty using Canvas. (5)

☐

I work too many hours to use the online course materials outside of class. (6)

☐

Other (please explain) (7) _____

Q8 How much did these issues affect your performance in this course?

☐

A great deal (1)

☐

Somewhat (2)

☐

Minimally (3)

☐

Not at all (4)

For questions 9-12, compare your English textbook to the learning materials you used in your other courses this semester. Please rate your level of satisfaction with the English textbook in each of the areas below.

Q9 Cost of learning materials

- ☐ Extremely satisfied (1)
 - ☐ Somewhat satisfied (2)
 - ☐ About the same as my other courses (3)
 - ☐ Somewhat dissatisfied (4)
 - ☐ Extremely dissatisfied (5)
-

Q10 Quality of information presented in learning materials

- ☐ Extremely satisfied (1)
 - ☐ Somewhat satisfied (2)
 - ☐ About the same as my other courses (3)
 - ☐ Somewhat dissatisfied (4)
 - ☐ Extremely dissatisfied (5)
-

Q11 Readability of learning materials

- ☐ Extremely satisfied (1)
 - ☐ Somewhat satisfied (2)
 - ☐ About the same as my other courses (3)
 - ☐ Somewhat dissatisfied (4)
 - ☐ Extremely dissatisfied (5)
-

Q12 Relevance of learning materials

- ☐ Extremely satisfied (1)
 - ☐ Somewhat satisfied (2)
 - ☐ About the same as my other courses (3)
 - ☐ Somewhat dissatisfied (4)
 - ☐ Extremely dissatisfied (5)
-

Q13 Is there anything else you would like us to know about your experiences in this class?

Q14 Did you receive a text or email message in November about spring course registration?

- ☐ I received the text and the email. (1)
- ☐ I received the email. (2)
- ☐ I received the text. (3)
- ☐ I don't recall receiving any messages. (4)

Q15 Are you registered for the winter session and/or the spring semester?

- ☐ Yes, I am registered and I am taking 15 or more credits. (1)
- ☐ Yes, I am registered, but I will be taking less than 15 credits. (2)
- ☐ No, I am not registered, but I plan to register soon. (3)
- ☐ No, I am not registered, and I do not plan to reenroll. (4)

Skip To: Q16 If Are you registered for the winter session and/or the spring semester? = No, I am not registered, and I do not plan to reenroll.

Skip To: Q16 If Are you registered for the winter session and/or the spring semester? = Yes, I am registered, but I will be taking less than 15 credits.

Skip To: Q17 If Are you registered for the winter session and/or the spring semester? = Yes, I am registered and I am taking 15 or more credits.

Skip To: Q17 If Are you registered for the winter session and/or the spring semester? = No, I am not registered, but I plan to register soon.

Q16 If you are registered for less than 15 credits or you do not plan to reenroll, please check the reason(s) below. (You may check more than one.)

☐

I can't afford to take more credits and/or continue going to school. (1)

☐

(2)

I need to work more hours and I don't have time to complete my school assignments.

☐

My hours at work conflict with scheduled class times. (3)

☐

I have family responsibilities that limit my availability. (4)

☐

I struggled academically this semester. (5)

☐

I am currently dealing with health issues. (6)

☐

It is difficult for me to find a ride to school on a consistent basis. (7)

☐

Other (please explain) (8) _____

Biographical Statement

Robyn Hallowell Griswold is the Vice President of Academic Affairs at Nashua Community College (NCC) in Nashua, New Hampshire where she formerly served as a history professor and chairperson of the Social Sciences Department. She began her career as a social studies teacher at Nashua High School after earning a master's degree in history and a master's degree in education from Harvard University. She later went on to work as an adjunct instructor at Rivier and Southern New Hampshire Universities where she taught graduate and undergraduate courses in education. Her publications include a book on cooperative learning strategies for U.S. history teachers as well as numerous educational resources for the history classroom produced by Jackdaw Publications. She is a national and local presenter on cooperative learning methods as well as other topics associated with curriculum, instruction, and assessment. After transitioning into higher education administration, she completed her doctorate in education at Johns Hopkins University with a specialization in Entrepreneurial Leadership in Education. Her research focuses on strategies to improve the retention and completion rates of community college students.